

CAVELIER

ABOGADOS

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BOGOTÁ 8, C/

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743

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 10-121092- -00002-0000

Fecha: 2010-12-03 11:43:07 Dep. 2020 DIR.NUEVASCR
Tra. 2 PATENTES Eve: 1 REGDEPOSITO
Act. 444 RESPUESTAREQUE Folios: 49

Señora Directora
DIRECCION DE NUEVAS CREACIONES
Superintendencia de Industria y Comercio
E. S. D.

Trámite : 002
Evento : 001
Actuación : 444

Referencia : Expediente No. 10.121.092
Asunto : Solicitud de patente para **UNA VALVULA NO-MECANICA PARA CONTROLAR LA DESCARGA DE SOLIDOS DE UN INTERCAMBIADOR DE CALOR EN-CAMA (IBHX) A UNA CFB**
Solicitante : **BABCOCK & WILCOX POWER GENERATION GROUP, INC**
Clase : B01J 008/000
Fecha de Solicitud : 30 de septiembre de 2010

CONTESTACION OFICIO No. 13994

1. Yo, Luz Clemencia de PAEZ, en mi condición de apoderada de la sociedad solicitante, **BABCOCK & WILCOX POWER GENERATION GROUP, INC**, doy contestación al requerimiento efectuado por este Despacho mediante Oficio No. **13994** notificado por fijación en lista el 28 de octubre de 2010, para lo cual presento los siguientes documentos:

1.1. Un (1) Documento en que consta la cesión del derecho a la patente efectuado por los cuatro (4) inventores en favor de la sociedad **BABCOCK & WILCOX POWER GENERATION GROUP, INC**.

Se presenta este documento en copia certificada del original que fue debidamente suscrito, notariado y legalizado por Apostille, junto con su correspondiente traducción oficial al español.

1.2. **Nuevo título:** De acuerdo con el resultado del primer examen de forma se requiere presentar nuevo título que permita identificar la materia de la cual trata la solicitud. Por lo tanto, solicito que el título de la patente sea modificado por:

"UNA VALVULA NO-MECANICA PARA CONTROLAR LA DESCARGA DE SOLIDOS DE UN INTERCAMBIADOR DE CALOR EN-CAMA (IBHX) A UNA CFB"

Para efectos de la modificación del título, acompaño con este escrito el correspondiente Formulario Único de Modificaciones y Correcciones.

CAVELIER

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2. **Prioridad:** Adicionalmente, presento con este escrito copia certificada de la solicitud de patente No. 12/570,823 presentada en Estados Unidos de América el 30 de septiembre de 2009, de la cual se reclama prioridad en esta solicitud de patente, junto con la correspondiente traducción al español.

3. De acuerdo con lo anterior, comedidamente solicito a Usted proseguir con el trámite de este asunto y ordenar la publicación de la solicitud de la patente identificada en la referencia.

Señora Directora,

Luiz Clemencia de Paéz
LUZ CLEMENCIA DE PAEZ
C.C. 35.456.344 de Usaquén
T.P.A. No. 23.555

 COLO-16645-801-004-7
SDC\SCT\ID-183271\WPC16645
No. M-2010-183271\SDC



Espacio reservado para el adhesivo de radicación

FORMULARIO UNICO DE CORRECCIONES Y MODIFICACIONES

1	SOLICITUD DE:	
	☐ Corrección de Error Material	☒ Modificación a una solicitud
2	SOLICITANTE	Nombre: BABCOCK & WILCOX POWER GENERATION GROUP, INC. Sociedad constituida y existente bajo las leyes del Estado de Delaware, Estados Unidos de América. Dirección: 20 south van buren avenue, Barberton, Ohio 44203-0351, Estados Unidos de América Domicilio: Barberton Ohio, Estados Unidos de América Teléfono: 546 09 70 Fax: 249 40 70 E-mail: clientes@cavelier.com
		IDENTIFICACION C.C. ☐ NIT ☐ C.E. ☐ Otro ☐ Número: _____
3	REPRESENTANTE O APODERADO	Nombre: Luz Clemencia de PAEZ Dirección: Carrera 4ª No. 72-35 Teléfono: 347 36 11 Fax: 217 92 11 E-mail: cavelier@cavelier.com
		IDENTIFICACION C.C. ☒ NIT ☐ C.E. ☐ Otro ☐ Número: <u>35.456.344</u> TP <u>23.555</u>
4	Número de expediente: <u>10.121.092</u>	
5	Descripción de la corrección o modificación solicitada: Solicito respetuosamente a su Despacho tener en cuenta que el nuevo titulo de esta solicitud de patente ha quedado como sigue: "UNA VALVULA NO-MECANICA PARA CONTROLAR LA DESCARGA DE SOLIDOS DE UN INTERCAMBIADOR DE CALOR EN-CAMA (IBHX) A UNA CFB"	
6	Comprobante de pago No. _____ Fecha: _____	
7	Anexos ☐ Comprobante de pago de la tasa por \$114.000, por concepto de modificaciones. ☐ Comprobante de pago por reivindicaciones adicionales después de la décima reivindicación por. ☐ Poderes, si fuere el caso ☐ Documento que acredita la existencia y representación legal de las partes, cuando sean personas jurídicas.	

60

8

NOMBRE:

LUZ CLEMENCIA DE PAEZ

FIRMA:

Luz Clemencia De Paez

C.C. 35.456.344 de Usaquén T.P.A. 23.555

SCT

404

APOSTILLE

(Convention de La Haye du 5 octobre 1961)

1. Country: United States of America

This public document

2. has been signed by T. Lawrence

3. acting in the capacity of Certifying Officer

4. bears the seal/stamp of U.S. Patent and Trademark Office

Certified

5. at Washington, D.C.

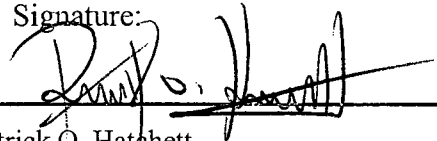
6. the thirtieth of September, 2010

7. by Assistant Authentication Officer, United States Department of State

8. No. 10044681-2

9. Seal/Stamp:

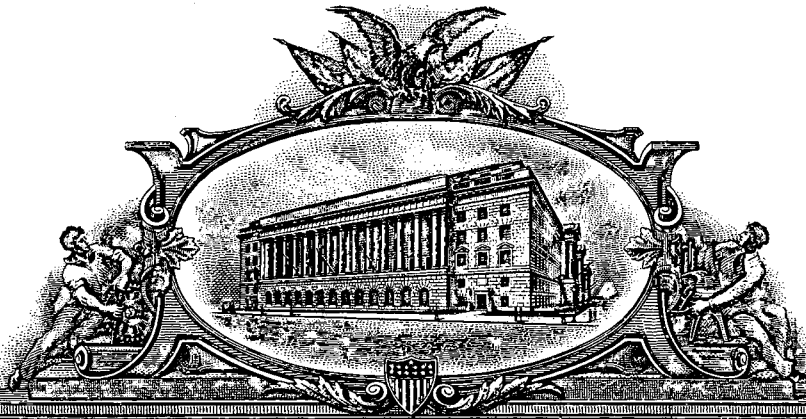
10. Signature:



Patrick O. Hatchett

62

A 7258332



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

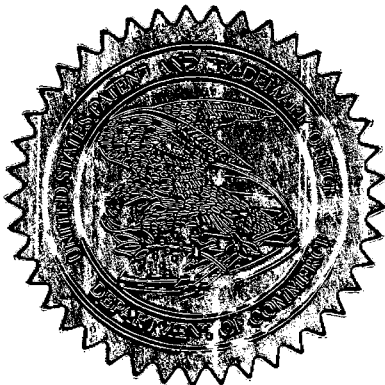
United States Patent and Trademark Office

September 15, 2010

**THIS IS TO CERTIFY THAT ANNEXED IS A TRUE COPY FROM THE
RECORDS OF THIS OFFICE OF A DOCUMENT RECORDED ON
OCTOBER 20, 2009.**

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

T. LAWRENCE
Certifying Officer



PATENT ASSIGNMENT

Electronic Version v1.1
Stylesheet Version v1.1

SUBMISSION TYPE:	NEW ASSIGNMENT										
NATURE OF CONVEYANCE:	ASSIGNMENT										
CONVEYING PARTY DATA											
<table border="1"><thead><tr><th>Name</th><th>Execution Date</th></tr></thead><tbody><tr><td>Mikhail Maryamchik</td><td>10/07/2009</td></tr><tr><td>Mark C. Godden</td><td>10/07/2009</td></tr><tr><td>Kiplin C. Alexander</td><td>10/07/2009</td></tr><tr><td>David L. Kraft</td><td>10/07/2009</td></tr></tbody></table>		Name	Execution Date	Mikhail Maryamchik	10/07/2009	Mark C. Godden	10/07/2009	Kiplin C. Alexander	10/07/2009	David L. Kraft	10/07/2009
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David L. Kraft	10/07/2009										
RECEIVING PARTY DATA											
<table border="1"><tr><td>Name:</td><td>Babcock & Wilcox Power Generation Group, Inc.</td></tr><tr><td>Street Address:</td><td>20 S. Van Buren Avenue</td></tr><tr><td>City:</td><td>Barberton</td></tr><tr><td>State/Country:</td><td>OHIO</td></tr><tr><td>Postal Code:</td><td>44203</td></tr></table>		Name:	Babcock & Wilcox Power Generation Group, Inc.	Street Address:	20 S. Van Buren Avenue	City:	Barberton	State/Country:	OHIO	Postal Code:	44203
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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>12570823</td></tr></tbody></table>		Property Type	Number	Application Number:	12570823						
Property Type	Number										
Application Number:	12570823										
CORRESPONDENCE DATA											
Fax Number: (330)860-6609 <i>Correspondence will be sent via US Mail when the fax attempt is unsuccessful.</i>											
Phone: 330-860-6605											
Email: cmahoney@babcock.com											
Correspondent Name: Carolyn Mahoney											
Address Line 1: 20 S. Van Buren Avenue											
Address Line 4: Barberton, OHIO 44203											
ATTORNEY DOCKET NUMBER:	7281										
NAME OF SUBMITTER:	Carolyn Mahoney										
Total Attachments: 3 source=executed_assignment#page1.tif											

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PATENT
REEL: 023393 FRAME: 0531

CH \$40.00 12570823

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PATENT
REEL: 023393 FRAME: 0532

65

ASSIGNMENT TO BABCOCK & WILCOX POWER GENERATION GROUP, INC.

CASE 7281

THIS ASSIGNMENT made the 7th day of October, 2009, by MIKHAIL MARYAMCHIK, residing at 3800 Rosemount Blvd. #113D, Fairlawn, Ohio 44333; and by KIPLIN C. ALEXANDER, residing at 476 Rolling Hills Drive, Wadsworth, Ohio 44281; and by MARK C. GODDEN, residing at 2359 Sesame Street NW, Mogadore, Ohio 44260; and by DAVID L. KRAFT, residing at 5882 Great Court Circle NW, Massillon, Ohio 44646, all citizens of the United States of America;

WITNESSETH: That

WHEREAS, we are the joint inventors of a certain new and useful improvement and invention in

IN-BED SOLIDS CONTROL VALVE

for which we have prepared and filed an application for Letters Patent of the United States on the 30th day of September, 2009, and

WHEREAS, BABCOCK & WILCOX POWER GENERATION GROUP, INC., a Corporation organized under the laws of the state of Delaware, U.S.A., and having its principal office at 20 S. Van Buren Ave., Barberton, Ohio, U.S.A., is desirous of acquiring the entire right, title, and interest in and to said improvement and invention, and any and all Letters Patent which shall be granted therefor;

NOW, THEREFORE, To All Whom It May Concern, be it known that for and in consideration of the sum of One Dollar (\$1.00) to us in hand paid, and other good and valuable considerations, the receipt of which is hereby acknowledged, we, MIKHAIL MARYAMCHIK, KIPLIN C. ALEXANDER, MARK C. GODDEN and DAVID L. KRAFT, have sold, assigned, transferred and set over, and by these presents do sell, assign, transfer and set over, unto said BABCOCK & WILCOX POWER GENERATION GROUP, INC., its successors and assigns, the entire right, title, and interest in and to the above-mentioned improvement, invention, and application for Letters Patent therefor, and in and to any and all Letters Patent of the United States which may hereinafter be granted therefor, and in and to any and all extensions, divisions, or reissues of said Letters Patent, the same to be held and enjoyed by said BABCOCK & WILCOX POWER GENERATION GROUP, INC., for its own use and behoof, and the use and behoof of its successors and assigns, to the full end of the term for which said Letters Patent may be granted, as fully and entirely as the same

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ASSIGNMENT TO BABCOCK & WILCOX POWER GENERATION GROUP, INC.

CASE 7281

would have been held and enjoyed by us had this assignment and sale not been made;

AND, for the consideration aforesaid, we hereby covenant and agree with said BABCOCK & WILCOX POWER GENERATION GROUP, INC., its successors and assigns, that at the time of the execution and delivery of these presents, we are the joint and lawful owners of the entire right, title, and interest in and to the above-mentioned improvement, invention, application, and Letters Patent above mentioned, and that the same are unencumbered, and that we have good right and lawful authority to sell and convey the same in the manner herein set forth;

AND, for the consideration aforesaid, we hereby covenant and agree with said BABCOCK & WILCOX POWER GENERATION GROUP, INC., its successors and assigns, that we will, whenever its counsel or the counsel of its successors or assigns, learned in the law, shall advise that an amendment or division or any other proceeding in connection with said application, including interference proceedings, is lawful and desirable or that a reissue or extension of said Letters Patent is lawful and desirable, sign all papers and drawings, take all rightful oaths, and do all acts necessary or required to be done for the procurement of valid Letters Patent for said improvement and invention, or for the reissue or extension of same, without charge to said BABCOCK & WILCOX POWER GENERATION GROUP, INC., or its successors or assigns, but at its or their expense.

We hereby request the Honorable Commissioner of Patents and Trademarks of the United States to issue the Letters Patent in accordance with this instrument.

AND, for the consideration aforesaid, we have sold, assigned, transferred and set over, and by these presents do sell, assign, transfer and set over, unto said BABCOCK & WILCOX POWER GENERATION GROUP, INC., its successors, assigns, or nominees, the entire right, title, and interest in and to any and all Letters Patent or other form of protection which may be granted in countries foreign to the United States, or other form of protection which may be granted and in and to any and all applications for Letters Patent or other form of protection which may be filed for said improvement and invention in countries foreign to the United States, including all rights to claim priority, and in and to the invention described in said applications; and we hereby authorize and empower said BABCOCK & WILCOX

ASSIGNMENT TO BABCOCK & WILCOX POWER GENERATION GROUP, INC.

CASE 7281

POWER GENERATION GROUP, INC., its successors, assigns, or nominees, to apply for Letters Patent, or other form of protection, on said improvement and invention, in its own name or in the name of its successors, assigns, or nominees, in any and all countries where it may desire to file such applications and where such applications may be filed by another other than the inventors; and we hereby covenant and agree to sign all papers and drawings, take all rightful oaths, and do all acts necessary or required to be done for the procurement of valid Letters Patent, or other form of protection, for said improvement and invention in countries foreign to the United States, and for further investing or confirming the right and title thereto in said BABCOCK & WILCOX POWER GENERATION GROUP, INC., its successors, assigns, or nominees, without charge to said BABCOCK & WILCOX POWER GENERATION GROUP, INC., its successors, assigns, or nominees, but at its or their expense.

IN WITNESS WHEREOF, we have hereunto set our hands and seal on the day and year first above written.

Mikhail Maryamchik
MIKHAIL MARYAMCHIK

Mark C. Godden
MARK C. GODDEN

Kiplin C. Alexander
KIPLIN C. ALEXANDER

David L. Kraft
DAVID L. KRAFT

WITNESSES:

Carolyn Mahoney

Ami J. Saus

STATE OF Ohio

COUNTY OF Summit ss.

On this, the 7th day of October, 2009, before me personally appeared Mikhail Maryamchik, Kiplin C. Alexander, Mark C. Godden, and David L. Kraft, me known and known to me to be the persons described in and who executed the foregoing instrument; and they acknowledged to me that they executed the same for the purpose therein stated.

SEAL



AMY M. SAUS
Notary Public, State of Ohio
Stark County
My Commission Expires Dec. 19, 2010
Page 3 of 3

Ami J. Saus

RECORDED: 10/20/2009

PATENT
REEL: 023393 FRAME: 0535

8

TRADUCCIÓN OFICIAL NO.815/2010

EL TEXTO QUE SIGUE ES TRADUCCIÓN FIEL Y COMPLETA DE UN DOCUMENTO ESCRITO EN INGLES; LLEVA SELLO Y FIRMA DE HELENA URIBE DE LEMOINE, TRADUCTORA E INTERPRETE OFICIAL, SEGÚN RESOLUCIÓN No. 3618 EXPEDIDA POR EL MINISTERIO DE JUSTICIA EL 6 DE SEPT. DE 1972.

ESTADOS UNIDOS DE AMÉRICA

A QUIEN CORRESPONDA, SALUDA Y HACE SABER:

**DEPARTAMENTO DE COMERCIO DE LOS ESTADOS UNIDOS
OFICINA DE PATENTES Y MARCAS COMERCIALES
DE LOS ESTADOS UNIDOS**

15 DE SEPTIEMBRE DE 2010

POR MEDIO DEL PRESENTE CERTIFICAMOS QUE EL DOCUMENTO ADJUNTO ES UNA COPIA FIDEDIGNA Y CORRECTA DE LOS REGISTROS DE ESTE DESPACHO Y SE RELACIONA CON EL DOCUMENTO RADICADO EL 20 DE OCTUBRE DE 2009.

POR AUTORIZACIÓN DEL SUB-SECRETARIO DE COMERCIO PARA LA PROPIEDAD INTELECTUAL Y DIRECTOR DE LA OFICINA DE MARCAS COMERCIALES Y PATENTES DE LOS ESTADOS UNIDOS.

FIRMADO: **T. LAWRENCE**, FUNCIONARIO CERTIFICADOR

HAY SELLO DE LA OFICINA DE MARCAS COMERCIALES Y PATENTES DE LOS ESTADOS UNIDOS DE AMÉRICA.



APOSTILLA

CONVENIO DE LA HAYA DEL 5 DE OCTUBRE DE 1961

1. PAÍS: ESTADOS UNIDOS DE AMÉRICA

EL PRESENTE DOCUMENTO PÚBLICO

2. HA SIDO FIRMADO POR: T. LAWRENCE
3. ACTUANDO EN SU CAPACIDAD DE: FUNCIONARIO CERTIFICADOR
4. LLEVA EL SELLO DE: OFICINA DE PATENTES Y MARCAS DE LOS ESTADOS UNIDOS

MINISTERIO DE
RELACIONES EXTERIORES
2010 OCT 28
JEFE DE LEGALIZACIONES
BOGOTÁ D.C.

CERTIFICADO

5. EN: WASHINGTON, D.C.
6. EL: 13 DE SEPTIEMBRE DE 2010
7. POR: FUNCIONARIO ASISTENTE DE AUTENTICACIONES
DEPARTAMENTO DE ESTADO, ESTADOS UNIDOS
8. BAJO EL NO.: 10044681-2
9. SELLO: DEPARTAMENTO DE ESTADO, ESTADOS UNIDOS DE AMÉRICA
10. FIRMADO: PATRICK O. HATCHETT

NO SE ASUME
RESPONSABILIDAD
DEL TEXTO
036472
HELENA URIBE DE LEMOINE
CUYA FIRMA APARECE EN EL
DOCUMENTO DESTINADO A
ASFUNCIONES INDICADAS

LA TRADUCTORA OFICIAL

Helena Uribe de Lemoine

HELENA URIBE DE LEMOINE



TRADUCCIÓN OFICIAL NO.815/2010

CESIÓN DE PATENTE

Versión Electrónica v1.1

Versión Impresa v1.1

TIPO DE PRESENTACIÓN	NUEVA CESIÓN
NATURALEZA DEL TRASPASO	CESIÓN

DATOS DE LA PARTE CEDENTE

NOMBRE	FECHA DE EJECUCIÓN
MIKHAIL MARYAMCHIK	10/07/2009
MARK C. GODDEN	10/07/2009
KIPLIN C. ALEXANDER	10/07/2009
DAVID L. KRAFT	10/07/2009

DATOS DE LA PARTE RECEPTORA

Nombre:	BABCOCK & WILCOX POWER GENERATION GROUP, INC.
Dirección	20. S. VAN BUREN AVENUE
CIUDAD	BARBERTON
ESTADO	OHIO
CÓDIGO POSTAL	44203

TOTAL NÚMEROS DE PROPIEDAD: 1

Tipo de Propiedad	Número
Número de solicitud:	12570823

DATOS PARA LA CORRESPONDENCIA

Número de Fax: (330) 880 6609

La correspondencia será enviada por la oficina postal de los Estados Unidos cuando el envío por fax no sea posible.

Teléfono: 330 860 6605
 Email: cmahoney@babcock.com
 Nombre del Corresponsal: Carolyn Mahoney
 Dirección - Línea 1: 20 S. Van Buren Avenue
 Dirección - Línea 2: Barberton, Ohio 44203

NUMERO DEL EXPEDIENTE	7281
NOMBRE DEL PRESENTADOR:	CAROLYN MAHONEY

TOTAL ANEXOS: 3

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ROLLO: 023393 - MICROFICHA: 0531

TRADUCCIÓN OFICIAL NO.815/2010

CESIÓN A BABCOCK & WILCOX POWER GENERATION GROUP, INC.

CASO 7281

LA PRESENTE CESIÓN se celebró el día 7 de Octubre de 2009 por MIKHAIL MARYAMCHIK, residente en 3800 Rosemount Blvd. #113D, Fairlawn, Ohio 44333; y por KIPLIN C. ALEXANDER, residente en 476 Rolling Hills Drive, Wadsworth, Ohio 44281; y por MARK C. GODDEN, residente en 2359 Sesame Street NW Mogadore, Ohio 44260; y por DAVID L. KRAFT, residente en 5882 Great Court Circle NW, Massillon, Ohio 44646, todos ellos ciudadanos de los Estados Unidos de América.

CONSIDERANDO

Que todos nosotros somos los inventores conjuntos de una cierta nueva y útil mejora e invención de una

VÁLVULA DE CONTROL DE SÓLIDOS EN EL LECHO

Para la cual se preparó y se radicó la Solicitud de Patente en los Estados Unidos, el **30 de Septiembre de 2009** y

Que **BABCOCK & WILCOX POWER GENERATION GROUP, INC.**, una corporación constituida bajo las leyes del Estado de Delaware, Estados Unidos de América, que tiene su oficina principal en 20 S. Van Buren Ave., Barberton, Ohio, U.S.A., desea adquirir el derecho, título e interés total en dicha mejora e invención y todas las Cartas de Patentes que sean otorgadas para la misma;

POR LO TANTO, nos permitimos informar a todos los interesados que en consideración a la suma de Un Dólar (US1.00) que reconocemos nos ha sido pagada y a otras buenas y valiosas consideraciones, cuyo recibo y suficiencia por el presente nosotros, **MIKHAIL MARYAMCHIK, KIPLIN C. ALEXANDER, MARK C. GODDEN y DAVID L. KRAFT**, hemos vendido, cedido, transferido y



TRADUCCIÓN OFICIAL NO.815/2010

traspasado y por los presentes vendemos, cedemos, transferimos y traspasamos a la mencionada **BABCOCK & WILCOX POWER GENERATION GROUP, INC.**, a sus sucesores y cesionarios, el derecho, título e interés total sobre las arriba mencionadas mejora, invención y solicitudes de patentes correspondientes y sobre todas las Cartas de Patentes de los Estados Unidos que puedan ser otorgadas de aquí en adelante a éste respecto, y todas las extensiones, divisiones o reemisiones de dichas Cartas de Patentes para que las mismas sean poseídas y disfrutadas por la mencionada **BABCOCK & WILCOX POWER GENERATION GROUP, INC.**, para su propio uso y disfrute y el uso y disfrute de sus sucesores y cesionarios hasta el final del término para el cual dichas cartas de Patentes sean otorgadas tan plena y totalmente como si las mismas hubiesen sido poseídas y disfrutadas por nosotros si la presente Cesión y venta no se hubiese efectuado;

Y, por la consideración arriba mencionada, por medio del presente aceptamos y acordamos con la mencionada **BABCOCK & WILCOX POWER GENERATION GROUP, INC.**, sus sucesores y cesionarios, que en el momento de la ejecución y entrega de las presentes somos los propietarios conjuntos y legales del derecho, título e interés total en la mejora, invención y solicitud arriba mencionadas, las Cartas de Patentes arriba mencionadas y que las mismas no han sido pignoradas y que nosotros poseemos el pleno derecho y la autoridad legal de vender y traspasar las mismas en la forma estipulada aquí;

Y por la consideración arriba mencionada declaramos y acordamos con la mencionada **BABCOCK & WILCOX POWER GENERATION GROUP, INC.**, sus sucesores y cesionarios, que nosotros, cuando sus asesores legales o los de sus sucesores o cesionarios, doctos en leyes, consideren que es legal y deseable efectuar una modificación o división o cualquier otro proceso en relación con dicha solicitud, incluyendo los procesos de interferencia, o que es legal y deseable la reemisión o prórroga de dichas Cartas de Patentes, firmaremos todos los

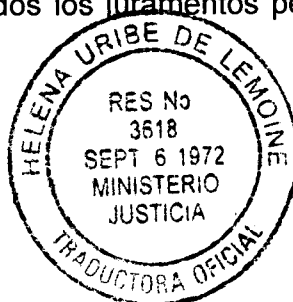


TRADUCCIÓN OFICIAL NO.815/2010

documentos y diseños, tomaremos todos los juramentos y efectuaremos todos los actos que sean necesarios o requeridos para obtener Cartas de Patentes válidas para dicha mejora e invento o para la reemisión o prórroga de las mismas sin cargo alguno para **BABCOCK & WILCOX POWER GENERATION GROUP, INC.** o sus sucesores o cesionarios, pero por propia cuenta y gasto de los mismos;

Por medio del presente solicitamos al Honorable Comisionado de Patentes y Marcas Comerciales de los Estados Unidos que expida las Cartas de Patente de conformidad con el presente Instrumento.

Y, por la consideración arriba mencionada hemos vendido, cedido, transferido y traspasado y por los presentes vendemos, cedemos, transferimos y traspasamos a la mencionada **BABCOCK & WILCOX POWER GENERATION GROUP, INC.**, a sus sucesores y cesionarios, o a sus respectivos nombrados el derecho, título e interés total en las mencionadas Cartas de Patentes o cualquier otra forma de protección que pueda ser otorgada en países distintos a los Estados Unidos o cualquier otra forma de protección que pueda ser otorgada así como para todas las solicitudes de Cartas de Patentes u otra forma de protección que pueda ser radicada para dicha mejora e invención en países distintos a los Estados Unidos, incluyendo todos los derechos de reclamar prioridad sobre el invento descrito y dichas solicitudes; y por medio del presente autorizamos y facultamos a la mencionada **BABCOCK & WILCOX POWER GENERATION GROUP, INC.**, a sus sucesores y cesionarios, o personas nombradas que soliciten las Cartas de Patentes u otras formas de protección sobre dicha mejora e invento en su propio nombre y a nombre de sus sucesores, cesionarios o personas nombradas en todos los países en donde pueda desearse radicar dicha solicitudes y en donde dichas solicitudes puedan ser radicadas por alguien distinto a los inventores; y por medio del presente nos comprometemos y aceptamos firmar todos los documentos y diseños, tomar todos los juramentos pertinentes y hacer todos los



TRADUCCIÓN OFICIAL NO.815/2010

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FIRMADO: KIPLIN C. ALEXANDER

FIRMADO: DAVID L. KRAFT

TESTIGOS:

FIRMADO: Carolyn Mahoney

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ESTADO DE OHIO

CONDADO DE SUMMIT

A LOS 7 DÍAS DEL MES DE OCTUBRE DE 2009 ANTE MI PERSONALMENTE
COMPARECIERON MIKHAIL MARYAMCHIK, KIPLIN C. ALEXANDER, MARK C.
GODDEN y DAVID L. KRAFT, A QUIENES CONOZCO Y SE QUE SON LAS
PERSONAS DESCRITAS Y QUIENES EJECUTARON EL ANTERIOR
INSTRUMENTO, Y RECONOCIERON ANTE MI, QUE EJECUTARON EL MISMO
PARA LOS FINES ALLÍ ESPECIFICADOS.

FIRMADO: AMY M. SAUS, NOTARIO PÚBLICO, ESTADO DE OHIO CONDADO
DE STARK, CON COMISIÓN HASTA EL 19 DE DICIEMBRE DE 2010.

HAY SELLO DEL NOTARIO.

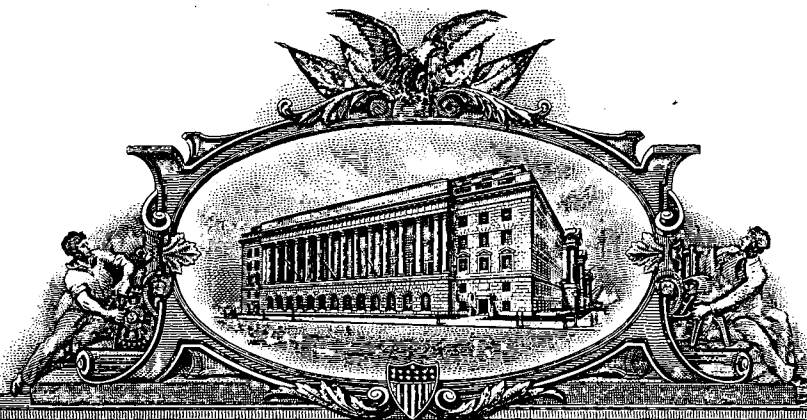
PATENTE

REGISTRADO: 10/20/2009

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APPLICATION NUMBER: 12/570,823

FILING DATE: September 30, 2009

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY
APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS
CONVENTION, IS US12/570,823

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M. TARVER
Certifying Officer

7-22

Electronic Acknowledgement Receipt

EFS ID:	6179197
Application Number:	12570823
International Application Number:	
Confirmation Number:	1896
Title of Invention:	IN-BED SOLIDS CONTROL VALVE
First Named Inventor/Applicant Name:	Mikhail Maryamchik
Customer Number:	41669
Filer:	Eric Marich/Carolyn Mahoney
Filer Authorized By:	Eric Marich
Attorney Docket Number:	7281
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Payment Type	Deposit Account
Payment was successfully received in RAM	\$1090
RAM confirmation Number	6590
Deposit Account	501813
Authorized User	

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		7281appl.pdf	116320 076ce27d8f8fddcf7726bf0dbf81a1317dd4282d	yes	13
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	8	
	Claims		9	12	
	Abstract		13	13	
Warnings:					
Information:					
2	Drawings-only black and white line drawings	7281_Figs_3shts.pdf	1195181 c3e44d687f000a6e94125b70496ab8cb3a992425	no	3
Warnings:					
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3	Oath or Declaration filed	DECLARATION.pdf	96259 36aa4da7bfe52e44ab7ac43bd08f607e31c48132	no	1
Warnings:					
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4	Fee Worksheet (PTO-875)	fee-info.pdf	32691 742215da671ce1e3727a82eb6c794bf331d87ba0	no	2
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New International Application Filed with the USPTO as a Receiving Office

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IN-BED SOLIDS CONTROL VALVE

FIELD AND BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates generally to the field of circulating fluidized bed (CFB) reactors or boilers such as those used in industrial or electric power generation facilities and, in particular, to a non-mechanical valve for controlling solids discharge from an in-bed heat exchanger (IBHX) to the CFB.

2. Description of the Related Art

[0002] United States Patent No. 6,532,905 to Belin et al. describes a CFB boiler with controllable IBHX. The boiler comprises a CFB reaction chamber as well as a bubbling fluidized bed (BFB) heat exchanger located inside the reaction chamber. Heat transfer in the heat exchanger is controlled by means of controlling the rate of solids discharge from the lower part of the BFB into the reaction chamber. In one embodiment, the discharge control is accomplished using at least one non-mechanical valve that is controlled via the supply of fluidizing gas in the vicinity of the valve.

[0003] Another method for controlling the heat transfer is disclosed in United States Patent No. 6,532,905. In this instance, heat transfer is controlled by using one or more conduits extending from a lower part of a BFB to an upper level at or above the lowest portion of the walls forming an IBHX enclosure. By fluidizing the solids particles in the conduit, their upward movement through the conduit is promoted, causing the solids particles to be discharged from the BFB into the surrounding CFB. By controlling the fluidizing gas flow rate, or the number of conduits in operation, the overall solids discharge from the BFB to the CFB is controlled, thus controlling heat transfer in the IBHX.

[0004] The higher the capacity of the CFB boiler and/or its exit steam parameters, the higher is the required heat duty of its IBHX. This is even more pronounced in an oxy-firing CFB boiler with elevated oxygen concentration, where the required heat duty of an IBHX for a given reaction chamber size increases drastically

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resulting in the increased height of the IBHX. Due to higher density of the BFB versus CFB, pressure differential across the non-mechanical valve may reach tens of inches of water column resulting in a high velocity of solids discharge through the valve and overall high flow rate of discharge. The latter may exceed a required rate of solids throughput and thus can adversely affect the controllability of the heat transfer. High solids velocity in the vicinity of the solids control valve may cause erosion of any adjacent tubes of the heating surface in the heat exchanger, as well as erosion of the bubble caps in the CFB reaction chamber in the wake of the jet from the valve.

[0005] Given the above, a need exists for a solids control valve that improves the operability and reliability of a CFB boiler where such a boiler contains a controllable IBHX.

SUMMARY OF THE INVENTION

[0006] The present invention improves operability and reliability of the CFB boiler with controllable IBHX utilizing at least one non-mechanical valve for controlling solids discharge from the IBHX into the CFB reaction chamber.

[0007] Accordingly, one aspect of the present invention is drawn to a circulating fluidized bed (CFB) boiler comprising: a CFB reaction chamber having side walls and a grid defining a floor at a lower end of the CFB reaction chamber for providing fluidizing gas into the CFB reaction chamber; a bubbling fluidized bed (BFB) located within a lower portion of the CFB reaction chamber and being bound by enclosure walls and the floor of the CFB reaction chamber; at least one controllable in-bed heat exchanger (IBHX), the IBHX occupying part of the reaction chamber floor and being surrounded by the enclosure walls of the BFB; and at least one non-mechanical valve designed to permit the control of solids discharge from the BFB into the CFB reaction chamber, the valve including at least one opening in the enclosure wall of the BFB, at least one independently controlled first fluidizing means located upstream of the at least one opening in the enclosure wall, at least one independently controlled second fluidizing means located downstream of the at least one opening in the enclosure wall, wherein the elevation of the bottom of the at least one non-mechanical valve opening in the

enclosure wall being at or above the top of both of the independently controlled first and second fluidizing means.

[0008] Another aspect of the present invention is drawn to a circulating fluidized bed (CFB) boiler comprising: a CFB reaction chamber having side walls and a grid defining a floor at a lower end of the CFB reaction chamber for providing fluidizing gas into the CFB reaction chamber; a bubbling fluidized bed (BFB) located within a lower portion of the CFB reaction chamber and being bound by enclosure walls and the floor of the CFB reaction chamber; at least one controllable in-bed heat exchanger (IBHX), the IBHX occupying part of the CFB reaction chamber floor and being surrounded by the enclosure walls of the BFB; and at least one non-mechanical valve designed to permit the control of solids discharge from the BFB into the CFB reaction chamber, the valve including at least one opening in the enclosure wall of the BFB, at least one independently controlled first fluidizing means located upstream of the at least one opening in the enclosure wall, at least one independently controlled second fluidizing means located downstream of the at least one opening in the enclosure wall, wherein the elevation of the bottom of the at least one non-mechanical valve opening in the enclosure wall being at or above the top of both of the independently controlled first and second fluidizing means, wherein the at least one IBHX is selected from one or more of a superheater, a reheater, an economizer or an evaporative surface, and wherein the tubes of the at least one IBHX are protected by a layer of erosion-resistant material formed on the surface of the tubes in the vicinity of the at least one opening.

[0009] The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific benefits attained by its uses, reference is made to the accompanying drawings and descriptive matter in which exemplary embodiments of the invention are illustrated.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] Fig. 1 is a sectional side elevational view of a CFB boiler according to the invention;

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- [0011]** Fig. 2 is a sectional plan view of the CFB boiler of Fig. 1, viewed in the direction of arrows 2-2;
- [0012]** Fig. 3 is a partial sectional side view of the CFB boiler according to a first embodiment of the invention, illustrating the flow control barrier located downstream of the fluidizing means located downstream of the opening; and
- [0013]** Fig. 4 is a partial sectional side view of the CFB boiler according to a second embodiment of the invention, illustrating the flow control barrier located upstream of the fluidizing means located downstream of the opening.

DESCRIPTION OF THE INVENTION

[0014] The present invention relates generally to the field of circulating fluidized bed (CFB) reactors or boilers such as those used in industrial or electric power generation facilities and, in particular, to a non-mechanical valve for controlling solids discharge from an in-bed heat exchanger (IBHX) to the CFB.

[0015] In the case of oxy-combustion, which typically implies using instead of air an oxidizing agent with increased oxygen concentration, typically comprised predominantly of oxygen and recycled flue gas, the terms "primary air" and "secondary air" should correspondingly be substituted with the terms "primary oxidant" and "secondary oxidant."

[0016] As used herein, the term CFB boiler will be used to refer to CFB reactors or combustors wherein a combustion process takes place. While the present invention is directed particularly to boilers or steam generators which employ CFB combustors as the means by which the heat is produced, it is understood that the present invention can readily be employed in a different kind of CFB reactor. For example, the invention could be applied in a reactor that is employed for chemical reactions other than a combustion process, or where a gas/solids mixture from a combustion process occurring elsewhere is provided to the reactor for further processing, or where the reactor merely provides an

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enclosure where particles or solids are entrained in a gas that is not necessarily a byproduct of the combustion process.

[0017] Referring now to the drawings, wherein like reference numerals designate the same or functionally similar elements throughout the several drawings and to Figs. 1 and 2 in particular, there is illustrated a CFB reactor or boiler, having a CFB reaction chamber 1 which comprises walls 2 (2a, 2b, 2c and 2d) and an IBHX 3 immersed in a BFB 4. The CFB within the reaction chamber 1 is predominantly comprised of solids made up of the ash from combustion of the fuel 5, sulfated sorbent 6 and, in some cases, external inert material 7 fed through at least one of the walls 2 and fluidized by primary air 8 supplied through a distribution grid 9 comprising a part of the reaction chamber floor. Some solids are entrained by gases resulting from the fuel combustion process and move upward as at 15 eventually reaching a particle separator 16, such as an impact-type particle separator or U-beams, at the reaction chamber exit. While some of the solids 17 pass the separator 16, the bulk of them 18 are captured and recycled back into the reaction chamber 1. Those solids along with others 19, falling out of the upflow solids stream 15, feed the BFB 4 that is being fluidized by fluidizing medium 25 fed through a distribution grid 26 comprising another part of the reaction chamber floor. Means 27 and 28, respectively, for removing solids from the CFB 1 and BFB 4, are provided in the pertinent areas of the reaction chamber floor.

[0018] The BFB 4 is separated from the CFB 1 by an enclosure 30. The walls forming the BFB enclosure 30 may be constructed in several ways. Preferably, the enclosure walls would be comprised of fluid cooled tubes 50 (shown in Fig. 3) covered with erosion resistant material such as refractory to prevent erosion of the tubes during operation. The tubes 50 forming the enclosure 30 extend upward to an elevation allowing the required BFB 4 height within the CFB reaction chamber 1. Above the required height, the tubes 50 group to form secondary air nozzles 55. Air 60 fed to these nozzles is injected into the CFB 1 beyond the BFB 4, thus its jets 65 do not deflect streams of solids 18 and 19 from falling onto the BFB 4. Grouping the tubes 50 allows forming openings 70 through which the solids streams 18 and 19 fall onto the BFB 4. After reaching the wall 2b, the tubes 50 become part of the wall. Secondary air

nozzles 75 on the opposite wall 2d are located externally to the CFB reaction chamber 1. Since no IBHX 3 is placed below the nozzles 75, their jets 80 do not cause any undesired effect.

[0019] Fig. 3 shows an enlarged view of the area around the non-mechanical valve 40. The valve comprises an opening 85 in the enclosure 30 and independently controlled fluidizing means 86 and 87, located respectively upstream and downstream of the opening 85. These fluidizing means can be implemented as a number of bubble caps connected to a corresponding source of fluidizing medium, 46 and 45, respectively. As is well known to those skilled in the art, the most common design of a distribution grid would be an array of bubble caps fed from a corresponding source of fluidizing medium, i.e. 8 for the CFB and 25 for the BFB. A bubble cap is comprised of a bubble cap proper and a supply pipe, typically referred to as the stem, which interconnects the fluidizing medium with the fluidized bed. Fluidizing gas is conveyed upwardly along the stem into the bubble cap, from which it is distributed to the fluidized bed via a plurality of outlet holes. Jets of fluidizing gas exiting from the outlet holes penetrate into the CFB or BFB bed providing its fluidization gas in the area around each bubble cap. To prevent erosion of the bubble caps in the vicinity of the opening 85 by the solids flow through the opening, the tops of the bubble caps should not be higher than the bottom of the opening 85.

[0020] A flow control barrier 90 can be placed downstream of the opening 85. It provides a restriction to the solids flow through the opening 85 and also deflects the solids jet from the opening away from the bubble caps 9 or other fluidizing means in the CFB reaction chamber 1. In one embodiment of the present invention, a flow control barrier 90 is placed downstream (see Fig. 3) of the fluidizing means 87. In a second embodiment, a flow control barrier is placed upstream (see Fig. 4) of the fluidizing means 87. The top of the flow control barrier 90 will be at least as high as the bottom of the opening 85 and may be higher than the top of the opening 85. The flow control barrier will be subject to high bed temperatures and substantial erosion impact from the solids flowing through the opening 85. This requires it to be made of high temperature

and erosion resistant material, e.g. ceramics or firebrick. Other options include making it of refractory-covered tubes.

[0021] The heating surface of the IBHX 3, which absorbs heat from the BFB 4, may be a superheater, reheater, economizer, evaporative or combinations of such types of heating surfaces which are known to those skilled in the art. The heating surface is typically comprised of tubes 91 which convey a heat transfer medium therethrough, such as water, a two-phase mix of water and steam, or steam. Their general erosion potential is low due to the low fluidizing velocity in the BFB 4 as well as the low velocity of solids throughput across the IBHX 3. However, in the vicinity of the opening 85 the velocity of solids traveling toward the opening increases substantially, which could increase the potential for erosion of the tubes 91. In order to reduce or prevent erosion of the tubes 91, it is thus preferable for them to be arranged so that they are not in the vicinity of the opening 85 (as shown in Fig. 3). Expected erosion rates can be estimated based upon an evaluation of the local solids velocity in the vicinity of the opening 85 (as determined by the volumetric discharge rate through the opening 85), as well as upon a consideration of the erosive characteristics of the solids. Based upon the erosion rate that can be tolerated, and the estimated erosion rate determined using the principles described above, the tubes 91 can be located to reduce erosion. Thus, as shown in Fig. 3, in order to reduce tube erosion the ends of the lower tubes 91 in the IBHX 3 are not in the vicinity of the opening 85 since they do not extend as close to the enclosure wall 30 and opening 85 as other tubes 91 in the IBHX 3. As a further precaution, parts of the tubes 91 adjacent to the opening 85 may be protected by a layer of erosion-resistant material 95, e.g. refractory held by studs welded to the tubes 91.

[0022] Control of the solids discharge from the BFB 4 to the CFB 1 is accomplished by controlling fluidizing medium flow rates 45 and 46. Gas flow to the vicinity of the solids control valve promotes solids discharge from the lower part of the BFB 4 into the CFB 1. Independent control of these flow rates, e.g. turning them on and off in alternate cycles, allows for smoothing the solids discharge rate. Particular fluidizing medium control patterns (frequency of cycling, length of a cycle, etc.) depend

on properties of the bed material and boiler operation requirements and should be established during boiler commissioning.

[0023] While specific embodiments of the present invention have been shown and described in detail to illustrate the application and principles of the invention, it will be understood that it is not intended that the present invention be limited thereto and that the invention may be embodied otherwise without departing from such principles. In some embodiments of the invention, certain features of the invention may sometimes be used to advantage without a corresponding use of the other features. Accordingly, all such changes and embodiments properly fall within the scope of the following claims.

CLAIMS

What is claimed is:

1. A circulating fluidized bed (CFB) boiler comprising:

a CFB reaction chamber having side walls and a grid defining a floor at a lower end of the CFB reaction chamber for providing fluidizing gas into the CFB reaction chamber;

a bubbling fluidized bed (BFB) located within a lower portion of the CFB reaction chamber and being bound by enclosure walls and the floor of the CFB reaction chamber;

at least one controllable in-bed heat exchanger (IBHX), the IBHX occupying part of the CFB reaction chamber floor and being surrounded by the enclosure walls of the BFB; and

at least one non-mechanical valve designed to permit the control of solids discharge from the BFB into the CFB reaction chamber, the valve including at least one opening in the enclosure wall of the BFB, at least one independently controlled first fluidizing means located upstream of the at least one opening in the enclosure wall, at least one independently controlled second fluidizing means located downstream of the at least one opening in the enclosure wall,

wherein the elevation of the bottom of the at least one non-mechanical valve opening in the enclosure wall being at or above the top of both of the independently controlled first and second fluidizing means.

2. The CFB boiler according to claim 1, further comprising at least one flow control barrier that is located downstream of the at least one opening in the enclosure wall, wherein the elevation of the top of the flow control barrier is at or above the elevation of the bottom of the at least one opening in the enclosure wall.

3. The CFB boiler according to claim 2, wherein the at least one flow control barrier is located downstream of the at least one independently controlled second fluidizing means.

4. The CFB boiler according to claim 2, wherein the at least one flow control barrier is located upstream of the at least one independently controlled second fluidizing means.

5. The CFB boiler according to claim 2, wherein the at least one flow control barrier is made of an abrasion resistant material.

6. The CFB boiler according to claim 2, wherein the at least one flow control barrier is made of refractory-covered tubes.

7. The CFB boiler according to claim 1, wherein the at least one IBHX is selected from one or more of a superheater, a reheater, an economizer or an evaporative surface.

8. The CFB boiler according to claim 1, wherein tubes of the at least one IBHX are arranged so that they are not in the vicinity of the at least one opening in order to reduce erosion of the tubes.

9. The CFB boiler according to claim 1, wherein the tubes of the at least one IBHX are protected by a layer of erosion-resistant material formed on the surface of the tubes in the vicinity of the at least one opening.

10. A circulating fluidized bed (CFB) boiler comprising:
a CFB reaction chamber having side walls and a grid defining a floor at a lower end of the CFB reaction chamber for providing fluidizing gas into the CFB reaction chamber;

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a bubbling fluidized bed (BFB) located within a lower portion of the CFB reaction chamber and being bound by enclosure walls and the floor of the CFB reaction chamber;

at least one controllable in-bed heat exchanger (IBHX), the IBHX occupying part of the CFB reaction chamber floor and being surrounded by the enclosure walls of the BFB; and

at least one non-mechanical valve designed to permit the control of solids discharge from the BFB into the CFB reaction chamber, the valve including at least one opening in the enclosure wall of the BFB, at least one independently controlled first fluidizing means located upstream of the at least one opening in the enclosure wall, at least one independently controlled second fluidizing means located downstream of the at least one opening in the enclosure wall,

wherein the elevation of the bottom of the at least one non-mechanical valve opening in the enclosure wall being at or above the top of both of the independently controlled first and second fluidizing means,

wherein the at least one IBHX is selected from one or more of a superheater, a reheater, an economizer or an evaporative surface, and

wherein the tubes of the at least one IBHX are protected by a layer of erosion-resistant material formed on the surface of the tubes in the vicinity of the at least one opening.

11. The CFB boiler according to claim 10, further comprising at least one flow control barrier that is located downstream of the at least one opening in the enclosure wall, wherein the elevation of the top of the flow control barrier is at or above the elevation of the bottom of the at least one opening in the enclosure wall.

12. The CFB boiler according to claim 11, wherein the at least one flow control barrier is located downstream of the at least one independently controlled second fluidizing means.

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13. The CFB boiler according to claim 11, wherein the at least one flow control barrier is located upstream of the at least one independently controlled second fluidizing means.

14. The CFB boiler according to claim 11, wherein the at least one flow control barrier is made of an abrasion resistant material.

15. The CFB boiler according to claim 11, wherein the at least one flow control barrier is made of refractory-covered tubes.

16. The CFB boiler according to claim 10, wherein tubes of the at least one IBHX are arranged so that they are not in the vicinity of the at least one opening in order to reduce erosion of the tubes.

ABSTRACT

A circulating fluidized bed (CFB) boiler comprising a reaction chamber. A bubbling fluidized bed (BFB) is contained within an enclosure within the lower portion of the reaction chamber and contains an in-bed heat exchanger (IBHX) that occupies part of the reaction chamber floor. At least one non-mechanical valve, which includes an opening between the CFB and BFB and independently controlled fluidizing means located both upstream and downstream of the opening, is used to control the heat transfer to the IBHX by controlling the solids discharge from the BFB to the CFB. The elevation of the bottom of the opening is at or above the elevation of the fluidizing means. A flow control barrier may be located downstream of the opening.

DECLARATION FOR PATENT APPLICATION

Docket No. 7281

As below named inventor, I hereby declare that: My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject **IN-BED SOLIDS CONTROL VALVE**, the specification of which:

(check) one ☒ is attached hereto

☐ was filed on _____ as United States or PCT International application Serial No. _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with 37 CFR §1.56.

I hereby claim foreign priority benefits under 35 USC §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or under §365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate, or PCT International application, having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Claimed

Yes ☐ No ☐

(Number)

(Country)

(Day/Month/Year Filed)

I hereby claim the benefit under 35 USC §119(e) of any United States provisional application(s) listed below.

(Application Serial No.)

(Day/Month/Year Filed)

I hereby claim the benefit under 35 USC §120 of any United States application(s), or under §365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 USC §112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR §1.56 which become available between the filing date of the prior application and the national or PCT International filing date of this application.

(Application Serial No.)

(Filing Date)

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I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: (1) Eric Marich, Reg. No. 32,265; (2) D. Neil LaHaye, Reg. No. 30,767; and (3) Michael J. Seymour, Reg. No. 54,436.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor **MIKHAIL MARYAMCHIK**

Inventor's signature _____

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Date _____ Citizenship US

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Inventor's signature _____

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Inventor's signature _____

Date _____ Citizenship US

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Massillon, Ohio 44646

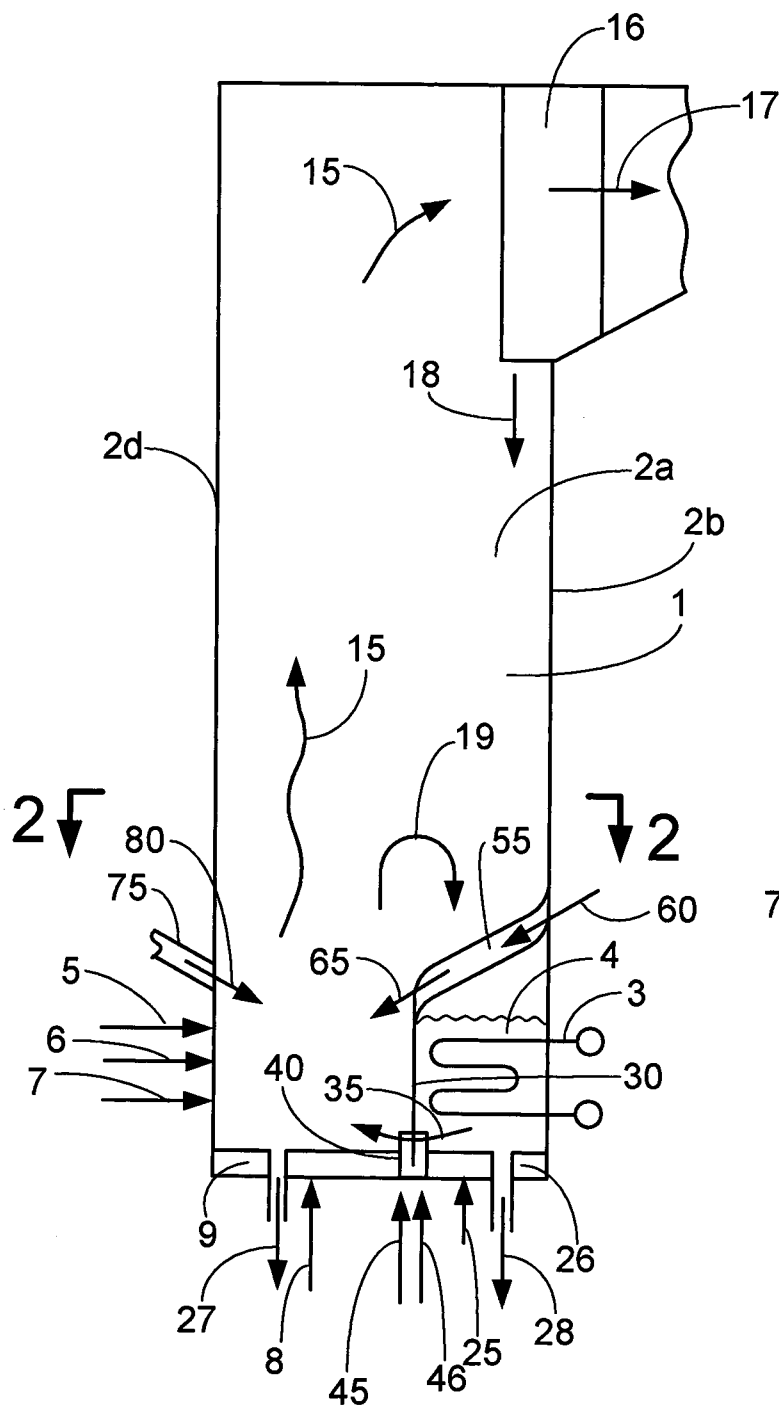


FIG. 1

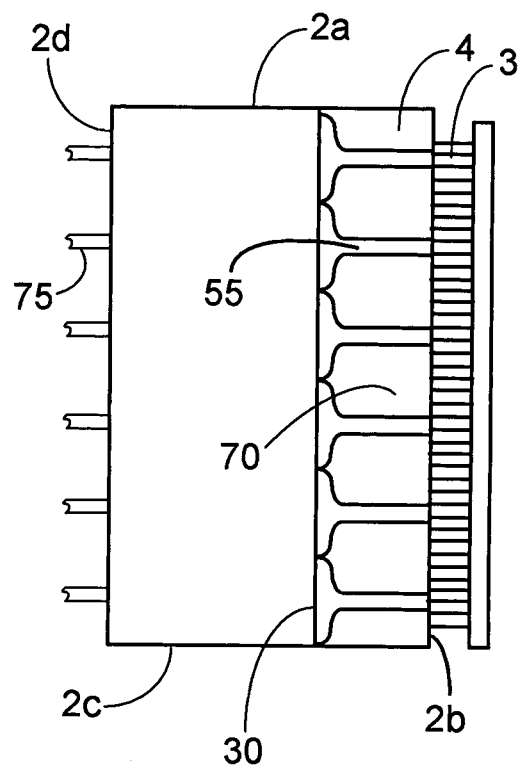


FIG. 2

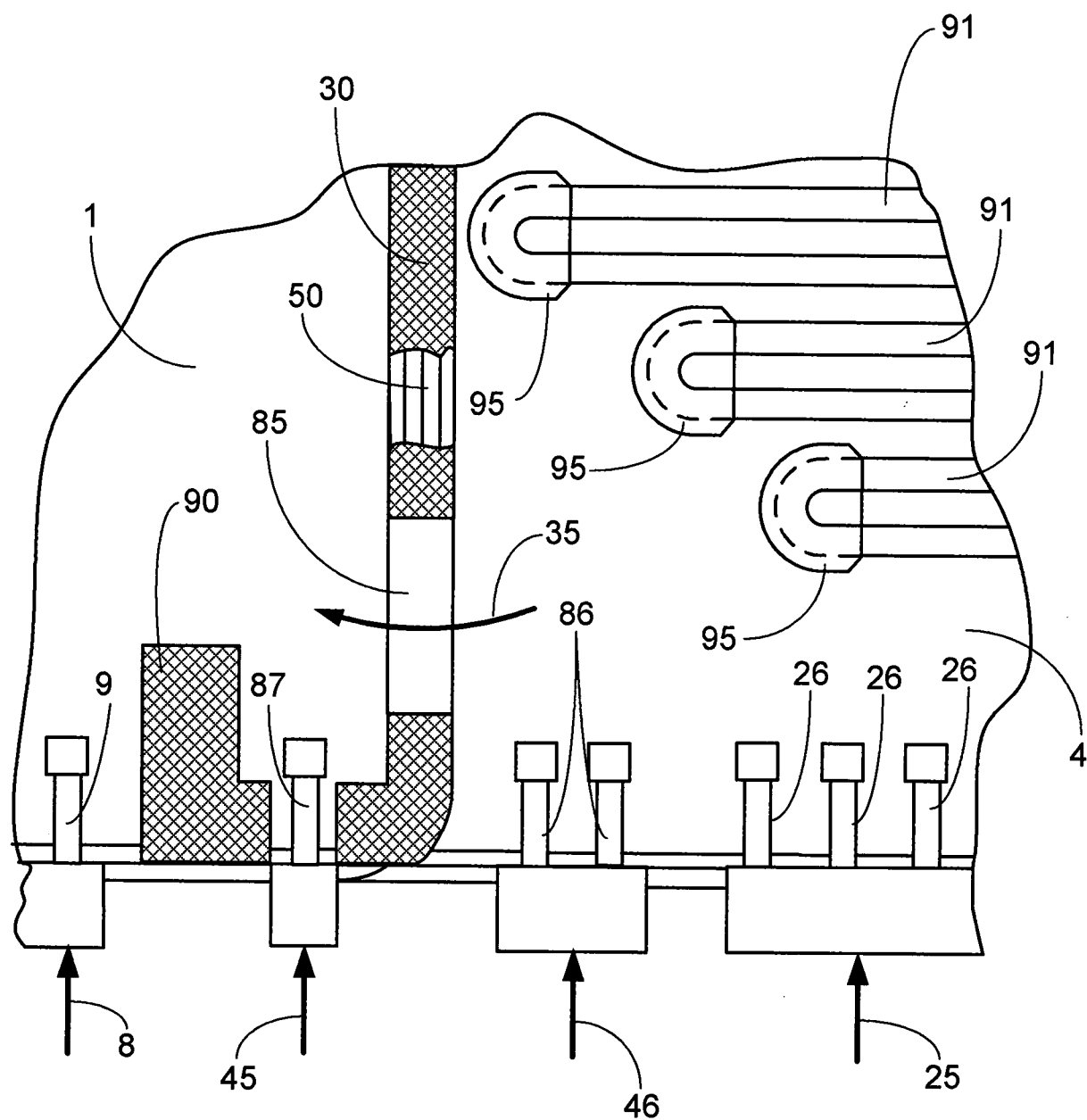


FIG. 3

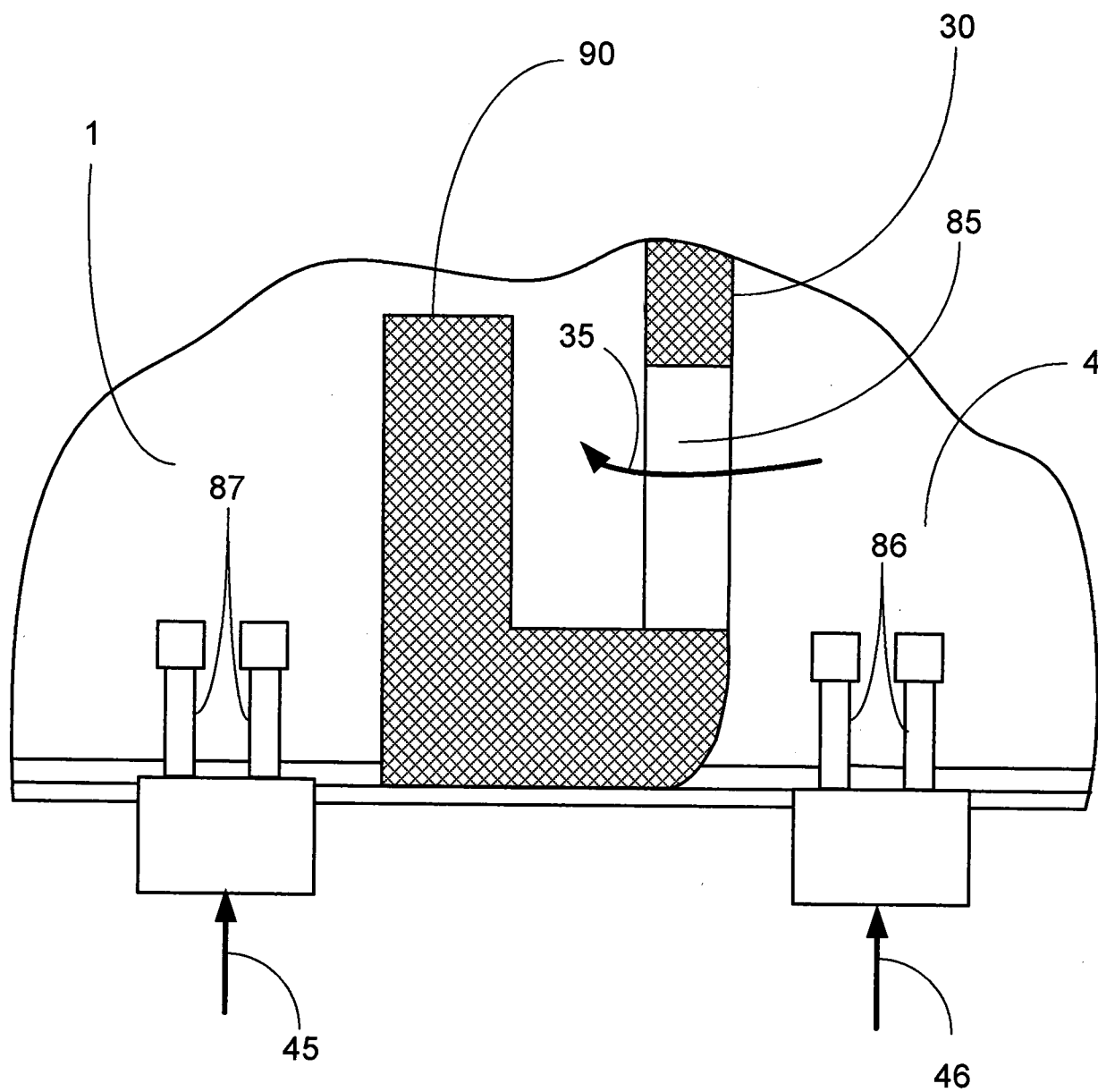


FIG. 4

LOS ESTADOS UNIDOS DE AMÉRICA
A TODOS QUIENES ESTO PUEDA INTERESAR
DEPARTAMENTO DE COMERCIO DE LOS ESTADOS UNIDOS
Oficina de patentes y marcar registradas de los Estados Unidos

Septiembre 16 de 2019

ESTO ES PARA CERTIFICAR QUE LOS ANEXO AQUÍ ES UNA FIEL COPIA DE
LOSS ARCHIVOS DE LA OFICNA DE DE PATENTES Y MARCAS REGISTRADAS
DE LOS ESTADOS UNIDOS Y ESTOS PAPELES DE LA APLICACIÓN DE
PATENTE IDENTIFICADA CUMPLEN CON LOS REQUISITOS PARA SER
CONCEDIDA EN LA FECHA DE PRESENTACIÓN BAJO 35 USC 111.

NÚMERO DE APLICACIÓN: 12/570,8823

FECHA DE PRESENTACION INICIAL: Septiembre 30 de 2009

EL CÓDIGO DEL PAÍS Y NÚMERO DE SU APLICACIÓN DE PRIORIDAD, PARA
SER USADO PARA PRESENTACIONES EN EL EXTRANJERO BAJO LA
CONVENCIÓN DE PARIS ES US12/570,823

Por la autoridad de

Bajo la Secretaría de Comercio y Propiedad Intelectual

y el Director de la ofician de patentes y Marcas Registradas de los Estados
Unidos.

Firma autógrafa de M TARVER

Oficial certificador

70

Sello de el departameto de Comercio

REIVINDICACIONES

Lo que se reivindica es:

1. Una caldera de cama de fluidez circulante (CFB) que comprende:
 - una cámara de reacción CFB que tiene paredes laterales y una rejilla que define un piso en una parte baja de la cámara de reacción CFB para proveer un gas de fluidez dentro de la cámara de reacción CFB;
 - una cama de fluidez de burbuja (BFB) ubicada dentro de una porción inferior de la cámara de reacción CFB y estando vinculada por paredes de cerramiento y el piso de la cámara de reacción CFB;
 - por lo menos un intercambiador de calor en cama (IBHX) controlable, el IBHX ocupando parte del piso de la cámara de reacción CFB y estando rodeado por las paredes de cerramiento de la BFB; y
 - por lo menos una válvula no-mecánica diseñada para permitir el control de descarga de sólidos desde la BFB hacia la cámara de reacción CFB, la válvula incluyendo por lo menos una abertura en la pared de cerramiento de la BFB, por lo menos un primer medio de fluidez independientemente controlado ubicado corriente arriba de por lo menos una abertura en la pared de cerramiento, por lo menos un segundo medio de fluidez independientemente controlado ubicado corriente abajo de por lo menos una abertura en la pared de cerramiento, en donde la elevación de la parte baja de por lo menos una abertura de válvula no-mecánica en la pared de cerramiento estando en o arriba de la parte superior de los dos medios de fluidez primero y segundo independientemente controlados.
2. La caldera CFB de acuerdo con la reivindicación 1, además

comprende por lo menos una barrera de control de flujo que está ubicada corriente abajo de por lo menos una abertura en la pared de cerramiento, en donde la elevación de la parte superior de la barrera de control de flujo está en o arriba de la elevación de la parte baja de por lo menos una abertura en la pared de cerramiento.

3. La caldera CFB de acuerdo con la reivindicación 2, en donde por lo menos una barrera de control de flujo está ubicada corriente abajo de por lo menos un segundo medio de fluidez independientemente controlado.

4. La caldera CFB de acuerdo con la reivindicación 2, en donde por lo menos una barrera de control de flujo está ubicada corriente arriba de por lo menos un segundo medio de fluidez independientemente controlado.

5. La caldera CFB de acuerdo con la reivindicación 2, en donde por lo menos una barrera de control de flujo está hecha de un material resistente a la abrasión.

6. La caldera CFB de acuerdo con la reivindicación 2, en donde por lo menos una barrera de control de flujo está hecha de tubos cubiertos de material refractario.

7. La caldera CFB de acuerdo con la reivindicación 1, en donde por lo menos un IBHX es seleccionado de uno o más de entre un súper calentador, un recalentador, un economizador o una superficie de evaporación.

8. La caldera CFB de acuerdo con la reivindicación 1, en donde los tubos de por lo menos un IBHX están organizados de tal forma que éstos no están

en la proximidad de por lo menos una abertura para reducir la erosión de los tubos.

9. La caldera CFB de acuerdo con la reivindicación 1, en donde los tubos de por lo menos un IBHX están protegidos por una capa de material resistente a la erosión formado en la superficie de los tubos en la proximidad de por lo menos una abertura.

10. Una caldera de cama de fluidez circulante (CFB) que comprende:
una cámara de reacción CFB que tiene paredes laterales y una rejilla que define un piso en una parte baja de la cámara de reacción CFB para proveer gas de fluidez dentro de la cámara de reacción CFB;

una cama de fluidez de burbuja (BFB) ubicada dentro de una porción baja de la cámara de reacción CFB y estando encuadrada por paredes de cerramiento y el piso de la cámara de reacción CFB;

por lo menos un intercambiador de calor en cama (IBHX) controlable, el IBHX ocupando parte del piso de la cámara de reacción CFB y estando rodeado por las paredes de cerramiento de la BFB; y

por lo menos una válvula no-mecánica diseñada para permitir el control de descarga de sólidos desde la BFB hacia la cámara de reacción CFB, la válvula incluyendo por lo menos una abertura en la pared de cerramiento de la BFB, por lo menos un primer medio de fluidez independientemente controlado ubicado corriente arriba de por lo menos una abertura en la pared de cerramiento, por lo menos un segundo medio de fluidez independientemente controlado ubicado corriente abajo de por lo menos una abertura en la pared de cerramiento,

en donde la elevación de la parte baja de por lo menos una abertura de válvula no-mecánica en la pared de cerramiento estando en o arriba de la parte superior de los dos medios de fluidez primero y segundo independientemente

controlados,

en donde por lo menos un IBHX es seleccionado de uno o más de entre un súper calentador, un recalentador, un economizador o una superficie de evaporación, y

en donde los tubos de por lo menos un IBHX están protegidos por una capa de material resistente a la erosión formado en la superficie de los tubos en la proximidad de por lo menos una abertura.

11. La caldera CFB de acuerdo con la reivindicación 10, además comprende por lo menos una barrera de control de flujo que está ubicada corriente abajo de por lo menos una abertura en la pared de cerramiento, en donde la elevación de la parte superior de la barrera de control del flujo está en o arriba de la elevación de la parte baja de por lo menos una abertura en la pared de cerramiento.

12. La caldera CFB de acuerdo con la reivindicación 11, en donde por lo menos una barrera de control de flujo está ubicada corriente abajo de por lo menos un segundo medio de fluidez independientemente controlado.

13. La caldera CFB de acuerdo con la reivindicación 11, en donde por lo menos una barrera de control de flujo está ubicada corriente arriba de por lo menos un segundo medio de fluidez independientemente controlado.

14. La caldera CFB de acuerdo con la reivindicación 11, en donde por lo menos una barrera de control de flujo está hecha de un material resistente a la abrasión.

15. La caldera CFB de acuerdo con la reivindicación 11, en donde por lo

menos una barrera de control de flujo está hecha de tubos cubiertos de material refractario.

16. La caldera CFB de acuerdo con la reivindicación 10, en donde los tubos de por lo menos un IBHX están organizados de tal forma que éstos no están en la proximidad de por lo menos una abertura para reducir la erosión de los tubos.

Eduardo Calado N.
Eduardo Calado Noguera
TRADUCTOR OFICIAL
Inglés - Español - Inglés
Res. 541 Febrero de 1976

2020
Bogotá D.C.,

Doctor(a)
SUAREZ DE PAEZ LUZ CLEMENCIA
Apoderado(a) y/o Representante de
BABCOCK & WILCOX POWER GENERATION GROUP, INC

REFERENCIA	Radicación No. 10 121092
	Trámite 2
	Evento 1
	Actuación 416
	Oficio No. 13281
	Folios 1

Teniendo en cuenta que la solicitud de privilegio de patente que se tramita bajo el expediente indicado en la referencia, reúne los requisitos de forma establecidos en los artículos 26 y 27 de la Decisión 486 de la Comisión de la Comunidad Andina, y en las demás disposiciones vigentes sobre la materia, se envía el extracto de la solicitud a la Oficina de Comunicaciones para efecto de su publicación en la Gaceta de Propiedad Industrial.

De acuerdo con lo previsto por el artículo 40 de la Decisión 486/00, la publicación en este caso se hará a partir del día 30 del mes de Marzo de 2012.

Cúmplase
Dado en Bogotá DC,



24 JUN. 2011

JOSE LUIS SALAZAR LOPEZ
Director de Nuevas Creaciones (C)

jfernand