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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/484,728	02/07/2023	11574372	91A-3US	1944

130443 7590 01/18/2023

Nissen Patent Law
#200, 10328- 81 Ave
Edmonton, ALBERTA T6E1X2
CANADA

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 729 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

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

Stephen Barbour, Lloydminster, CANADA;

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

Upstream Data Inc., Lloydminster, CANADA;

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16484728
Filing Date	2018-02-06
First Named Inventor	Stephen Barbour
Art Unit	
Examiner Name	
Attorney Docket Number	91A-3US

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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
Change(s) applied to document, /S.D./ 1/5/2023	1	9967333		2018-05-08	~~Dell Products LP~~ Chen et al.	
	2	8305757		2012-11-06	~~Innertech IP LP~~ Keisling et al.	
	3	8254124		2012-08-28	Keisling et al.	
	4	8297067		2012-10-30	Keisling et al.	
	5	8601827		2013-12-10	Keisling et al.	
	6	9282684		2016-03-08	Keisling et al.	
	7	9763366		2017-09-12	Keisling et al.	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16484728
Filing Date	2019-08-08
First Named Inventor	Stephen Barbour
Art Unit	
Examiner Name	
Attorney Docket Number	91A-3US

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	1	7542947		2009-06-02	Guyon, et al.	
	2	8156206		2012-04-10	Kiley, et al.	
	3	8483715		2013-07-09	Chen	
	4	9495668		2016-11-15	Juels	

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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	20150261269		~~2017-06-13~~ 09/2015	Bruscoe	
	2	20150292303		2015-10-15	Dusseault, et al.	

Change(s) applied to document, /S.D./ 1/5/2023

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

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CANADA

EXAMINER	
REAGAN, JAMES A	

ART UNIT	PAPER NUMBER
3688	

MAIL DATE	DELIVERY MODE
01/06/2023	PAPER

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.

Corrected ***Notice of Allowability***	**Application No.** 16/484,728	**Applicant(s)** Barbour, Stephen	
	Examiner JAMES A REAGAN	**Art Unit** 3688	**AIA (FITF) Status** Yes

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

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to the amendment and response filed on 07/04/2022..
   ☐ 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 1-9,12-13 and 15-44 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information , please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

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

   Certified copies:

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

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

   * Certified copies not received: _____ .

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

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

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

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

Attachment(s)

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

/JAMES A REAGAN/
Primary Examiner, Art Unit 3688

DETAILED ACTION

Status of Claims

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

This action is in reply to the amendment and response filed on **07/04/2022**.

Claims 1, 3, 5-9, 12, 13, 15, 16, 18-21, 23-29, 31, 33-38, and 40 have been amended.

Claims 42-44 have been added.

Claims 10, 11, 14, have been canceled.

Claims 1-9, 12, 13, and 15-44 are currently pending and have been examined.

Information Disclosure Statement

The Information Disclosure Statements filed **06/03/2022** and **074/04/2022** have been considered. Initialed copies of the Form 1449 are enclosed herewith.

Allowable Subject Matter

Claims 1-9, 12, 13, and 15-44 are allowed.

Reasons For Allowance

The following is an Examiner's statement of reasons for allowance:

With regard to any rejections under 35 USC § 101 based upon the Alice Corporation Pty. Ltd. v. CLS Bank guidelines, the Examiner finds that the claimed invention amounts to significantly more than a judicial exception or an abstract idea. Also, the claimed invention demonstrates a practical application. The specification clearly teaches and describes blockchain mining at hydrocarbon facility. Any rejections under 35 USC § 101 are hereby withdrawn Additionally, the 2019 PEG defines the phrase "integration into a practical application" to require an additional element(s) or a combination of additional elements in the claim to apply, rely on, or use the judicial exception in a manner that imposes a meaningful limit on the judicial exception, such that it is more than a drafting effort designed to monopolize the exception. See MPEP 2106.04(d). I

With regard to the rejections under 35 USC § 103, the Examiner has carefully reviewed the Applicants responses filed on **07/04/2022**. Based upon the Applicants arguments and assertions, the Examiner is persuaded by and agrees with the Applicant. The assertions and arguments provided by the Applicant credibly declare and make clear that the independent claims and the limitations contained therein are allowable either in part or taken as a whole over the prior art of record. None of the art of record, taken individually or combination, disclose at least the method step or system components contained within the independent claims. Consequently, The prior art of record fails to fully disclose or reasonable teach the independent claims as a whole. See MPEP 1302.14. Moreover, even though the individual references applied in the prior art may teach each individual limitation sufficiently, there does not appear to be sufficient grounds for combining or modifying the prior art of record to adequately arrive at the claimed invention. See MPEP 2143.01.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Non Patent Literature:

- **YOUTUBE**. "Using Natural Gas To Mine Bitcoin With Matthew Lohstroh." (18 September 2019). Retrieved online 04/16/2022. https://www.youtube.com/watch?v=TYpsZzlevow
- **WayBack Machine**. "New Century Exploration." (2022). Retrieved online 04/16/2022. https://web.archive.org/web/20220401000000*/https://www.newcenturyexp.com/
- **WayBack Machine**. "New Century Exploration – What We Do." (2022). Retrieved online 04/16/2022. https://web.archive.org/web/20220330234542/https://www.newcenturyexp.com/
- **YOUTUBE**. "Why is natural gas flared? What is the solution?" (23 July 2015). Retrieved online 04/17/2022. https://www.youtube.com/watch?v=4_vEUniOAs8

Foreign Art:

- **HANKE TIMO TOBIAS et al.** "BLOCK MINING METHODS AND APPARATUS." (WO 2015/077378 A1)
- **TAYLOR NINA**. "This New Monetary Innovation Method/process Using Crypto Currency Applies To And For Entities, Which Require An Income/revenue Producing Asset Using Any Form Of Named/renamed Crypto Currency, Using Any Form Of Blockchain/chain Process Using The Wallet Which Mints/Mines New Coin Assets." ((AU 2014/101324 A4)
- **TERRY GARY MCALISTER.** "New Stock/share/bond Innovation Using Principle Mined Cryptographic Currency/digital Mining Assets/commodities Which Secondary Mine For Stock/share/bond Holders On/using The Blockchain/any Chain/shared Ledger On A Cryptographic Currency/digital Mining Assets/commodities Exchange." (AU 2016/100178 A4)
- **MCALISTER GARY.** "Blockchain Digital Mining Asset/Commodity Innovation For Private Placement, High Yield Investment, Tier 1,2,3, MTN Buy/sell Structured Financial Trading Programs And Platforms." (AU 2016/100394 A4)

Any inquiry of a general nature or relating to the status of this application or concerning this communication or earlier communications from the Examiner should be directed to **James A. Reagan** (james.reagan@uspto.gov) whose telephone number is **571.272.6710.** The Examiner can normally be reached on Monday-Friday, 9:30am-5:00pm. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, **KAMBIZ ABDI** can be reached at **571.272.6702**.

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://portal.uspto.gov/external/portal/pair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at **866.217.9197** (toll-free).

Any response to this action should be mailed to:

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PO Box 1450

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or faxed to **571-273-8300**.

Hand delivered responses should be brought to the **United States Patent and Trademark Office Customer Service Window**:

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401 Dulany Street

Alexandria, VA 22314.

/JAMES A REAGAN/
Primary Examiner, Art Unit 3688

james.reagan@uspto.gov
571.272.6710 (Office)
571.273.6710 (Desktop Fax)

Notice of References Cited	Application/Control No. 16/484,728	Applicant(s)/Patent Under Reexamination Barbour, Stephen	
	Examiner JAMES A REAGAN	Art Unit 3688	Page 1 of 4

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20200161865-A1	05-2020	Clifton; Eric Douglass	H02J7/0068	1/1
*	B	US-20180181153-A1	06-2018	TAKAHASHI; Hirotaka	G05F1/66	1/1
*	C	US-20190018394-A1	01-2019	Sayyarrodsari; Bijan	G06Q10/0833	1/1
*	D	US-20170349058-A1	12-2017	Bernier; Kevin T.	H02J3/14	1/1
*	E	US-20190267644-A1	08-2019	BERNTSEN; George P.	B60L50/72	1/1
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*	H	US-20170207629-A1	07-2017	SEKI; Akira	G05B15/02	1/1
*	I	US-20180284707-A1	10-2018	Menon; Anup	F02C9/28	1/1
*	J	US-20170329908-A1	11-2017	Braswell; Anthony	G16H40/20	1/1
*	K	US-20170352010-A1	12-2017	SON; Jong Duk	G06Q10/20	1/1
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*	M	US-20180152023-A1	05-2018	Guruprasad; Ranjini B.	H02J3/38	1/1

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*	N	AU-2014101324-A4	12-2014	AU	TAYLOR N	
*	O	WO-2015077378-A1	05-2015	WO	HANKE T	G06Q20/0655
*	P	AU-2016100178-A4	03-2016	AU	TERRY G M	
*	Q	AU-2016100394-A4	05-2016	AU	MCALISTER G	
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*	V	• WayBack Machine. "New Century Exploration." (2022). Retrieved online 04/16/2022. https://web.archive.org/web/20220401000000*/https://www.newcenturyexp.com/ (Year: 2022)
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*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. 16/484,728	Applicant(s)/Patent Under Reexamination Barbour, Stephen	
	Examiner JAMES A REAGAN	Art Unit 3688	Page 2 of 4

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*	B	US-20180042064-A1	02-2018	Norton; Mark	H05B47/20	1/1
*	C	US-20170243290-A1	08-2017	Brown; Michael Sean	G06Q30/0202	1/1
*	D	US-9630614-B1	04-2017	Hill; William McGinley	F02B63/047	1/1
*	E	US-20150316903-A1	11-2015	Asmus; Matthew J.	G06Q10/06	700/291
*	F	US-20170302077-A1	10-2017	YABE; Masaaki	H02J3/005	1/1
*	G	US-20150012622-A1	01-2015	Omatsu; Fumio	G06Q10/10	709/220
*	H	US-20120185414-A1	07-2012	Pyle; Richard	G01W1/10	706/11
*	I	US-20140324237-A1	10-2014	Oe; Ryuji	G06Q40/00	700/287
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*	C	US-20140096837-A1	04-2014	Belady; Christian L.	F16L55/0333	138/26
*	D	US-8849469-B2	09-2014	Belady; Christian L.	G06Q30/04	700/297
*	E	US-20080135238-A1	06-2008	Cugnet; Matt	E21B41/005	166/256
*	F	US-20160261685-A1	09-2016	Chen; YuLing	H04W12/35	1/1
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*	H	US-10367353-B1	07-2019	McNamara; Michael T.	G06F1/3206	1/1
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*	B	US-20150337218-A1	11-2015	Ricotta; Joseph A.	C10G53/02	208/187
*	C	US-20170358041-A1	12-2017	Forbes, Jr.; Joseph W.	H02J3/008	1/1
*	D	US-20180109541-A1	04-2018	Gleichauf; Paul Harry	H04W12/06	1/1
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*	F	US-20190306176-A1	10-2019	Gleichauf; Paul Harry	H04W12/10	1/1
*	G	US-10721240-B2	07-2020	Gleichauf; Paul Harry	H04L67/1097	1/1
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*	I	US-9155230-B2	10-2015	Eriksen; André Sloth	H05K7/20781	1/1
*	J	US-9089078-B2	07-2015	Branton; Steven B.	H05K7/20263	1/1
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/484,728	Barbour, Stephen
	Examiner	Art Unit
	JAMES A REAGAN	3688

CPC - Searched*		
Symbol	**Date**	**Examiner**
(G06Q50/06 OR E21B41/00 OR F02M21/0209 OR F02M21/0218 OR G05B15/02 OR G06F16/2315 OR G06Q10/06313 OR H04L67/104 OR H04L67/1097 OR G06Q2220/00 OR H02J9/06 OR G06Q10/06).cpc. Further limited by keyword and text searching in PE2E Search Tool	04/17/2022	JAR
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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.

/JAMES A REAGAN/ Primary Examiner, Art Unit 3688	

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/484,728	Barbour, Stephen
	Examiner	Art Unit
	JAMES A REAGAN	3688

Search Notes		
Search Notes	**Date**	**Examiner**
Reviewed IDS in PE2E Search Tool	04/17/2022	JAR
Inventor and Assignee name search in PE2E Search Tool	04/17/2022	JAR
Forward/Backward search in PE2E Search Tool	04/17/2022	JAR
PE2E Search Tool, GOOGLE, GOOGLE PATENTS, BING, DUCKDUCKGO, GOOGLE SCHOLAR, IP.COM, DIALOG	04/17/2022	JAR
Reviewed IDS in PE2E Search Tool	08/21/2022	JAR
Inventor and Assignee name search in PE2E Search Tool	08/21/2022	JAR
Forward/Backward search in PE2E Search Tool	08/21/2022	JAR
PE2E Search Tool, GOOGLE, GOOGLE PATENTS, BING, DUCKDUCKGO, GOOGLE SCHOLAR, IP.COM, DIALOG	08/21/2022	JAR

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
PE2E	Interference	08/21/2022	JAR

/JAMES A REAGAN/ Primary Examiner, Art Unit 3688	

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/484,728	Barbour, Stephen
	Examiner	**Art Unit**
	JAMES A REAGAN	3688

CPC						
Symbol					**Type**	**Version**
G06Q	/	50	/	06	F	2013-01-01
G06F	/	16	/	2315	I	2019-01-01
E21B	/	41	/	00	I	2013-01-01
F02M	/	21	/	0209	I	2013-01-01
F02M	/	21	/	0218	I	2013-01-01
G05B	/	15	/	02	I	2013-01-01
G06Q	/	10	/	06313	I	2013-01-01
H04L	/	67	/	104	I	2013-01-01
H04L	/	67	/	1097	I	2013-01-01
G06Q	/	2220	/	00	A	2013-01-01
H02J	/	9	/	06	A	2013-01-01

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

NONE (Assistant Examiner) (Date)	**Total Claims Allowed:** 41	
/JAMES A REAGAN/ Primary Examiner, Art Unit 3688 (Primary Examiner) (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

U.S. Patent and Trademark Office Part of Paper No.: 20230104

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/484,728	Barbour, Stephen
	Examiner	**Art Unit**
	JAMES A REAGAN	3688

INTERNATIONAL CLASSIFICATION					
CLAIMED					
G06Q	/	30	/	00	

NON-CLAIMED					
	/		/		

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

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

NONE (Assistant Examiner) (Date)	**Total Claims Allowed:** 41	
/JAMES A REAGAN/ Primary Examiner, Art Unit 3688 (Primary Examiner) (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/484,728	Barbour, Stephen
	Examiner	**Art Unit**
	JAMES A REAGAN	3688

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	x	10	16	19	28	28	37	37						
2	2	x	11	17	20	29	29	38	38						
3	3	10	12	18	21	30	30	39	39						
4	4	11	13	19	22	31	31	40	40						
5	5	x	14	20	23	32	32	41	41						
6	6	12	15	24	24	33	33	21	42						
7	7	13	16	25	25	34	34	22	43						
8	8	14	17	27	26	35	35	23	44						
9	9	15	18	26	27	36	36								

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 41	
/JAMES A REAGAN/ Primary Examiner, Art Unit 3688 (Primary Examiner)	(Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

U.S. Patent and Trademark Office Part of Paper No.: 20230104

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors: STEPHEN BARBOUR | Attorney Docket No.: 91A-3US

Application No.: 16/484,728 | Art Unit: 3688 / Confirmation No.: 1944

Filed: August 08, 2019 | Examiner: Reagan, James A

Title: BLOCKCHAIN MINE AT OIL OR GAS FACILITY

ISSUE FEE PAYMENT AND AMENDMENT AFTER ALLOWANCE UNDER CFR 1.312

September 12, 2022

TO THE COMMISSIONER FOR PATENTS:

INTRODUCTORY COMMENTS

In response to the notice of allowance dated August 31, 2022, Applicant submits the issue fee and an amendment after allowance under CFR 1.312. Specifically, Applicant requests that the patent office please amend the above identified application as follows:

Amendments to the Claims are reflected in the listing of the claims, which begins on page 2 of this paper.

Remarks/Arguments begin on page 10 of this paper.

OK TO ENTER: /J.A.R/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors: STEPHEN BARBOUR | Attorney Docket No.: 91A-3US

Application No.: 16/484,728 | Art Unit: 3688 / Confirmation No.: 1944

Filed: August 08, 2019 | Examiner: Reagan, James A

Title: BLOCKCHAIN MINE AT OIL OR GAS FACILITY

ISSUE FEE PAYMENT AND AMENDMENT AFTER ALLOWANCE UNDER CFR 1.312

September 12, 2022

TO THE COMMISSIONER FOR PATENTS:

INTRODUCTORY COMMENTS

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Amendments to the Claims are reflected in the listing of the claims, which begins on page 2 of this paper.

Remarks/Arguments begin on page 10 of this paper.

AMENDMENTS TO THE CLAIMS

1. (Previously presented) A system comprising:

a source of combustible gas produced from a facility selected from a group consisting of a hydrocarbon production, storage, or processing facility;

a generator connected to the source of combustible gas to receive a continuous flow of combustible gas to power the generator; and

blockchain mining devices connected to the generator;

in which:

the blockchain mining devices each have a mining processor and are connected to a network interface;

the network interface is connected to receive and transmit data through the internet to a network that stores or has access to a blockchain database;

the mining processors are connected to the network interface and adapted to mine transactions associated with the blockchain database and to communicate with the blockchain database;

the network is a peer-to-peer network;

the blockchain database is a distributed database stored on plural nodes in the peer-to-peer network; and

the blockchain database stores transactional information for a digital currency.

2. (Original) The system of claim 1 isolated from a sales gas line and an external electrical power grid.

3. (Previously presented) The system of claim 1 in which:

the source of combustible gas and the facility comprise a remote well selected from a group consisting of a remote oil or gas well; and

the remote well is connected to produce the continuous flow of combustible gas to power the generator.

4. (Original) The system of claim 3 further comprising a combustion engine connected to the source of combustible gas and connected to drive the generator.

5. (Previously presented) The system of claim 4 in which the combustion engine is a prime mover that is connected to produce oil from the remote well.

6. (Previously presented) The system of claim 4 in which the combustion engine is a first combustion engine, and further comprising a second combustion engine that is a prime mover that is connected to produce oil from the remote well.

7. (Previously presented) The system of claim 1 in which:

the facility comprises a unit selected from a group consisting of an oil storage or processing unit;

the source of combustible gas comprises the unit, which has a gas outlet connected to supply combustible gas to operate the generator; and

the unit is connected to receive oil produced from a remote oil well.

8. (Previously presented) The system of claim 1 in which the generator and blockchain mining devices are located adjacent to the facility.

9. (Previously presented) The system of claim 1 in which the facility comprises a plurality of remote wells selected from a group consisting of remote oil or gas wells, and one or both of the following conditions are satisfied:

the plurality of remote wells are located on a multi-well pad; or

the plurality of remote wells include a satellite well.

10-11. (Cancelled)

12. (Previously presented) The system of claim 1 in which the system is configured to modulate a power load level exerted by the blockchain mining devices on the generator, by increasing or decreasing the mining activity of the mining processor.

13. (Currently amended) The system of claim 12 in which the system is configured to modulate the ~~maximum~~ power load level by selecting one or more actions from a group of actions consisting of increasing or decreasing a maximum number of mining processors that are engaged in mining transactions.

14. (Cancelled)

15. (Currently amended) The system of claim [[13]] 12 in which the system is configured to modulate the power load level in response to variations in a production rate of combustible gas from the ~~remote well~~ hydrocarbon production well, storage, or processing facility.

16. (Currently amended) The system of claim [[13]]12 in which:

a production rate of combustible gas from the ~~remote well~~ hydrocarbon production well, storage, or processing facility varies between a daily minimum production rate and a daily maximum production rate; and

while the production rate is above the daily minimum production rate, the controller is set to limit the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate.

17. (Original) The system of claim 16 in which the controller is set to divert to a load bank excess electricity produced by the generator.

18. (Currently amended) The system of claim [[13]] 12 in which:

a production rate of combustible gas from the ~~remote well~~ hydrocarbon production well, storage, or processing facility varies between a daily minimum production rate and a daily maximum production rate;

the controller is set to limit the power load level to above a power level producible by the generator when the production rate is at the daily minimum production rate; and

a backup source, selected from a group consisting of fuel or electricity, is connected make up a shortfall in fuel or electricity, respectively, required to supply the blockchain mining devices with the power load level.

19. (Previously presented) The system of claim 1 in which a controller is connected to operate a cooling system to maintain the blockchain mining devices within a predetermined operating range of temperature.

20. (Previously presented) The system of claim 1 in which the blockchain mining devices are housed in a portable enclosure that is structured to one or more of form a skid or be mounted on a trailer.

21. (Previously presented) The system of claim 20 in which the portable enclosure comprises a generator driven by an engine, which is connected to the source of combustible gas.

22. (Original) The system of any claim 21 in which the engine comprises a turbine.

23. (Previously presented) The system of claim 20 in which the portable enclosure comprises an intermodal transport container.

24. (Previously presented) A method comprising:

producing electricity using a generator and a source of combustible gas produced at a facility selected from the group consisting of a hydrocarbon production well, storage, or processing facility, and operating blockchain mining devices located at the facility, respectively, using the electricity, in which:

the generator is connected to the source of combustible gas, in which the facility is connected to produce a continuous flow of combustible gas to power the generator;

the blockchain mining devices each have a mining processor and are connected to a network interface;

the network interface is connected to receive and transmit data through the internet to a network that stores or has access to a blockchain database;

the mining processors are connected to the network interface and adapted to mine transactions associated with the blockchain database and to communicate with the blockchain database;

the network is a peer-to-peer network;

the blockchain database is a distributed database stored on plural nodes in the peer-to-peer network; and

the blockchain database stores transactional information for a digital currency.

25. (Previously presented) The method of claim 24 further comprising, prior to using the source of combustible gas:

one or both disconnecting or diverting the source of combustible gas from a combustible gas disposal device at the facility; and

connecting the source of combustible gas to operate the blockchain mining devices.

26. (Previously presented) The method of claim 24 further comprising:

connecting the source of combustible gas to operate the blockchain mining devices; and

diverting gas from a combustible gas disposal device to operate the blockchain mining devices.

27. (Previously presented) The method of claim 25 in which the combustible gas disposal device comprises one or more of a flare, a vent to the atmosphere, an incinerator, or a burner.

28. (Previously presented) The method of claim 24 in which the facility is selected from a group consisting of an oil or gas well that is isolated from a sales gas line and an external electrical power grid.

29. (Previously presented) The method of claim 24 in which the source of combustible gas is a remote well selected from a group consisting of a remote oil or gas well.

30. (Currently amended) The method of claim [[29]] 24 in which producing further comprises supplying combustible gas to a combustion engine that is connected to drive the generator.

31. (Currently amended) The method of claim [[30]] 24, in which producing further comprises supplying combustible gas to a combustion engine that is connected to drive the generator, and further comprising using the combustion engine as a prime mover to produce oil from the ~~remote well~~ hydrocarbon production well, storage, or processing facility.

32. (Original) The method of claim 31 in which, prior to using the source of combustible gas, the combustion engine is under loaded as the prime mover, and further comprising connecting the generator to a power takeoff connected to the combustion engine.

33. (Previously presented) The method of claim 30 in which the combustion engine is a first combustion engine, the remote well is a remote oil well, and further comprising:

prior to supplying combustible gas to the first combustion engine, connecting the first combustion engine to receive combustible gas from the remote oil well; and

using a second combustion engine as a prime mover to produce oil from the remote oil well.

34. (Previously presented) The method of claim 29 further comprising operating the blockchain mining devices to:

mine transactions with the blockchain mining devices; and

communicate wirelessly through the internet to communicate with a blockchain database.

35. (Previously presented) The method of claim 34 further comprising modulating a power load level exerted by the blockchain mining devices on the generator, by selecting an action from

a group of actions consisting of increasing or decreasing, a mining activity of the blockchain mining devices.

36. (Previously presented) The method of claim 35 in which:

modulating comprises modulating the power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining transactions.

37. (Currently amended) The method of claim 36 in which modulating comprises modulating the power load level in response to variations in a production rate of combustible gas from the ~~remote well~~ hydrocarbon production well, storage, or processing facility.

38. (Currently amended) The method of claim 35 in which:

a production rate of combustible gas from the ~~remote well~~ hydrocarbon production well, storage, or processing facility varies between a daily minimum production rate and a daily maximum production rate; and

modulating comprises limiting, while the production rate is above the daily minimum production rate, the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate.

39. (Original) The method of claim 38 further comprising diverting to a load bank excess electricity produced by the generator.

40. (Currently amended) The method of claim 35 in which:

a production rate of combustible gas from the ~~remote well~~ hydrocarbon production well, storage, or processing facility varies between a daily minimum production rate and a daily maximum production rate;

modulating comprises limiting the power load level to above a power level produced by the generator when the production rate is at the daily minimum production rate; and

supplying from a backup source, which is selected from a group consisting of a backup fuel or electricity source, a shortfall in fuel or electricity, respectively, required to supply the blockchain mining devices with the power load level.

41. (Original) The method of claim 40 in which the power load level is limited to above a power level produced by the generator when the production rate is at the daily maximum production rate.

42. (Previously presented) The system of claim 20 in which the portable enclosure has the form of a box with walls, a top, and a base, with one or more access doors formed in the walls.

43. (Previously presented) The system of claim 1 further comprising a combustible gas disposal device, at the facility, the combustible gas disposal device being connected to receive combustible gas from the source of combustible gas.

44. (Previously presented) The system of claim 43 further comprising a valve connected upstream of the generator to receive the continuous flow of gas from the source of combustible gas, and selectively supply the continuous flow of gas to the generator, the combustible gas disposal device, or both the generator and the combustible gas disposal device, to selectively divert the continuous flow of gas to the combustible gas disposal device, the generator, or both the generator and the combustible gas disposal device, respectively.

REMARKS

This amendment is made to clarify wording within several of the dependent claims in the claim set. The amendments are explained in further detail below. The amendment is disclosed in and supported by the application, and does not change the scope of the independent claims. The proposed changes require no additional search or examination, and are patentable.

Amendments to the Claims

Claim 13 is amended to relax the word "maximum" to avoid antecedent issues and as supported by the application as filed, for example para. 71.

The dependencies of Claims 15, 16, 18, 30, and 31 are amended for clarity.

Claims 15, 16, 18, 37, 38, and 40, are amended to relax the remote well to hydrocarbon production well, storage, or processing facility, as supported by the application as filed, for example paras. 71 (discusses power modulation based on varying gas supply levels provided by a remote well or hydrocarbon production, storage, or processing facility), and 72-75.

Claim 31 is also amended to relax the remote well to hydrocarbon production well, storage or processing facility, as supported by the application as filed, for example paras. 8, 12, and 42-43.

CONCLUSION

Applicant submits the required fees for issuance herewith. Issuance of the application with the amended claims is respectfully requested.

September 12, 2022

Respectfully submitted,

/robertnissen#64256/

_____

Robert A. Nissen
Agent of Record
Registration no. 64,256
Customer no. 130443
Telephone 780-802-7904

Electronic Patent Application Fee Transmittal					
Application Number:	16484728				
Filing Date:	06-Jan-2020				
Title of Invention:	BLOCKCHAIN MINE AT OIL OR GAS FACILITY				
First Named Inventor/Applicant Name:	Stephen Barbour				
Filer:	Robert Anton Nissen/Matthew Froehlick				
Attorney Docket Number:	91A-3US				
Filed as Small Entity					
Filing Fees for U.S. National Stage under 35 USC 371					
Description		**Fee Code**	**Quantity**	**Amount**	**Sub-Total in USD($)**
Basic Filing:					
Pages:					
Claims:					
Miscellaneous-Filing:					
Petition:					
Patent-Appeals-and-Interference:					
Post-Allowance-and-Post-Issuance:					
UTILITY APPL ISSUE FEE		2501	1	600	600

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**600**

Electronic Acknowledgement Receipt	
EFS ID:	46596058
Application Number:	16484728
International Application Number:	
Confirmation Number:	1944
Title of Invention:	BLOCKCHAIN MINE AT OIL OR GAS FACILITY
First Named Inventor/Applicant Name:	Stephen Barbour
Customer Number:	130443
Filer:	Robert Anton Nissen/Matthew Froehlick
Filer Authorized By:	Robert Anton Nissen
Attorney Docket Number:	91A-3US
Receipt Date:	12-SEP-2022
Filing Date:	06-JAN-2020
Time Stamp:	17:09:33
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$600
RAM confirmation Number	E20229BH10140048
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	91A-3US_Fee_transmittal.pdf	83646 bde3ed8d3594a0f140063b26290f0235c3617384	no	1
Warnings:					
Information:					
2		91A-3US_amendment_after_allowance.pdf	97559 ba8213afdc8ba07bb63f5b535ad1580093087ed1	yes	10

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment after Notice of Allowance (Rule 312)	1	1
	Claims	2	9
	Applicant Arguments/Remarks Made in an Amendment	10	10

Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	38305 7fb9bf5115798933b6af88be9492d5232002e9e5	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	219510		

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.

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
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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)

130443 7590 08/31/2022

Nissen Patent Law
#200, 10328- 81 Ave
Edmonton, ALBERTA T6E1X2
CANADA

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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.
16/484,728	01/06/2020	Stephen Barbour	91A-3US	1944

TITLE OF INVENTION: BLOCKCHAIN MINE AT OIL OR GAS FACILITY

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	11/30/2022

EXAMINER	ART UNIT	CLASS-SUBCLASS
REAGAN, JAMES A	3688	705-063000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

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

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

1 Robert A. Nissen
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: Upstream Data Inc.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Llyodminster, Canada

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 //RobertNissen#64256// Date September 12, 2022

Typed or printed name Robert A. Nissen Registration No. 64256

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NOTICE OF ALLOWANCE AND FEE(S) DUE

130443 7590 08/31/2022

Nissen Patent Law
#200, 10328- 81 Ave
Edmonton, ALBERTA T6E1X2
CANADA

EXAMINER
REAGAN, JAMES A

ART UNIT	PAPER NUMBER
3688	

DATE MAILED: 08/31/2022

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/484,728	01/06/2020	Stephen Barbour	91A-3US	1944

TITLE OF INVENTION: BLOCKCHAIN MINE AT OIL OR GAS FACILITY

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	11/30/2022

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. 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)

130443 7590 08/31/2022

Nissen Patent Law
#200, 10328- 81 Ave
Edmonton, ALBERTA T6E1X2
CANADA

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.
16/484,728	01/06/2020	Stephen Barbour	91A-3US	1944

TITLE OF INVENTION: BLOCKCHAIN MINE AT OIL OR GAS FACILITY

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	11/30/2022

EXAMINER	ART UNIT	CLASS-SUBCLASS
REAGAN, JAMES A	3688	705-063000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

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

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

1_____
2_____
3_____

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

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required) ❑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.
16/484,728	01/06/2020	Stephen Barbour	91A-3US	1944

130443 7590 08/31/2022

Nissen Patent Law
#200, 10328- 81 Ave
Edmonton, ALBERTA T6E1X2
CANADA

EXAMINER	
REAGAN, JAMES A	
ART UNIT	PAPER NUMBER
3688	

DATE MAILED: 08/31/2022

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. 16/484,728	Applicant(s) Barbour, Stephen	
	Examiner JAMES A REAGAN	Art Unit 3688	AIA (FITF) Status Yes

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

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to the amendment and response filed on 07/04/2022..
   ☐ 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 1-9,12-13 and 15-44 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information , please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

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

   Certified copies:

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

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

   * Certified copies not received: _____ .

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

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

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

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

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 06/03/2022 and 074/04/2022.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/JAMES A REAGAN/
Primary Examiner, Art Unit 3688

DETAILED ACTION

Status of Claims

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

This action is in reply to the amendment and response filed on **07/04/2022**.

Claims 1, 3, 5-9, 12, 13, 15, 16, 18-21, 23-29, 31, 33-38, and 40 have been amended.

Claims 42-44 have been added.

Claims 10, 11, 14, have been canceled.

Claims 1-9, 12, 13, and 15-44 are currently pending and have been examined.

Information Disclosure Statement

The Information Disclosure Statements filed **06/03/2022** and **074/04/2022** have been considered. Initialed copies of the Form 1449 are enclosed herewith.

Allowable Subject Matter

Claims 1-9, 12, 13, and 15-44 are allowed.

Reasons For Allowance

The following is an Examiner's statement of reasons for allowance:

With regard to any rejections under 35 USC § 101 based upon the Alice Corporation Pty. Ltd. v. CLS Bank guidelines, the Examiner finds that the claimed invention amounts to significantly more than a judicial exception or an abstract idea. Also, the claimed invention demonstrates a practical application. The specification clearly teaches and describes blockchain mining at hydrocarbon facility. Any rejections under 35 USC § 101 are hereby withdrawn Additionally, the 2019 PEG defines the phrase "integration into a practical application" to require an additional element(s) or a combination of additional elements in the claim to apply, rely on, or use the judicial exception in a manner that imposes a meaningful limit on the judicial exception, such that it is more than a drafting effort designed to monopolize the exception. See MPEP 2106.04(d). I

With regard to the rejections under 35 USC § 103, the Examiner has carefully reviewed the Applicants responses filed on **07/04/2022**. Based upon the Applicants arguments and assertions, the Examiner is persuaded by and agrees with the Applicant. The assertions and arguments provided by the Applicant credibly declare and make clear that the independent claims and the limitations contained therein are allowable either in part or taken as a whole over the prior art of record. None of the art of record, taken individually or combination, disclose at least the method step or system components contained within the independent claims. Consequently, The prior art of record fails to fully disclose or reasonable teach the independent claims as a whole. See MPEP 1302.14. Moreover, even though the individual references applied in the prior art may teach each individual limitation sufficiently, there does not appear to be sufficient grounds for combining or modifying the prior art of record to adequately arrive at the claimed invention. See MPEP 2143.01.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Non Patent Literature:

- **YOUTUBE**. "Using Natural Gas To Mine Bitcoin With Matthew Lohstroh." (18 September 2019). Retrieved online 04/16/2022. https://www.youtube.com/watch?v=TYpsZzlevow
- **WayBack Machine**. "New Century Exploration." (2022). Retrieved online 04/16/2022. https://web.archive.org/web/20220401000000*/https://www.newcenturyexp.com/
- **WayBack Machine**. "New Century Exploration – What We Do." (2022). Retrieved online 04/16/2022. https://web.archive.org/web/20220330234542/https://www.newcenturyexp.com/
- **YOUTUBE**. "Why is natural gas flared? What is the solution?" (23 July 2015). Retrieved online 04/17/2022. https://www.youtube.com/watch?v=4_vEUniOAs8

Foreign Art:

- **HANKE TIMO TOBIAS et al.** "BLOCK MINING METHODS AND APPARATUS." (WO 2015/077378 A1)
- **TAYLOR NINA**. "This New Monetary Innovation Method/process Using Crypto Currency Applies To And For Entities, Which Require An Income/revenue Producing Asset Using Any Form Of Named/renamed Crypto Currency, Using Any Form Of Blockchain/chain Process Using The Wallet Which Mints/Mines New Coin Assets." ((AU 2014/101324 A4)
- **TERRY GARY MCALISTER.** "New Stock/share/bond Innovation Using Principle Mined Cryptographic Currency/digital Mining Assets/commodities Which Secondary Mine For Stock/share/bond Holders On/using The Blockchain/any Chain/shared Ledger On A Cryptographic Currency/digital Mining Assets/commodities Exchange." (AU 2016/100178 A4)
- **MCALISTER GARY.** "Blockchain Digital Mining Asset/Commodity Innovation For Private Placement, High Yield Investment, Tier 1,2,3, MTN Buy/sell Structured Financial Trading Programs And Platforms." (AU 2016/100394 A4)

Any inquiry of a general nature or relating to the status of this application or concerning this communication or earlier communications from the Examiner should be directed to **James A. Reagan** (james.reagan@uspto.gov) whose telephone number is **571.272.6710.** The Examiner can normally be reached on Monday-Friday, 9:30am-5:00pm. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, **KAMBIZ ABDI** can be reached at **571.272.6702**.

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://portal.uspto.gov/external/portal/pair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at **866.217.9197** (toll-free).

Any response to this action should be mailed to:

Commissioner for Patents

PO Box 1450

Alexandria, Virginia 22313-1450

or faxed to **571-273-8300**.

Hand delivered responses should be brought to the **United States Patent and Trademark Office Customer Service Window**:

Randolph Building

401 Dulany Street

Alexandria, VA 22314.

/JAMES A REAGAN/
Primary Examiner, Art Unit 3688

james.reagan@uspto.gov
571.272.6710 (Office)
571.273.6710 (Desktop Fax)

Notice of References Cited	Application/Control No. 16/484,728	Applicant(s)/Patent Under Reexamination Barbour, Stephen	
	Examiner JAMES A REAGAN	Art Unit 3688	Page 1 of 4

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20200161865-A1	05-2020	Clifton; Eric Douglass	H02J7/0068	1/1
*	B	US-20180181153-A1	06-2018	TAKAHASHI; Hirotaka	G05F1/66	1/1
*	C	US-20190018394-A1	01-2019	Sayyarrodsari; Bijan	G06Q10/0833	1/1
*	D	US-20170349058-A1	12-2017	Bernier; Kevin T.	H02J3/14	1/1
*	E	US-20190267644-A1	08-2019	BERNTSEN; George P.	B60L50/72	1/1
*	F	US-20190122132-A1	04-2019	RIMINI; Noa	G06N7/005	1/1
*	G	US-20170302171-A1	10-2017	GOTO; Kazuya	G05B15/02	1/1
*	H	US-20170207629-A1	07-2017	SEKI; Akira	G05B15/02	1/1
*	I	US-20180284707-A1	10-2018	Menon; Anup	F02C9/28	1/1
*	J	US-20170329908-A1	11-2017	Braswell; Anthony	G16H40/20	1/1
*	K	US-20170352010-A1	12-2017	SON; Jong Duk	G06Q10/20	1/1
*	L	US-20170169344-A1	06-2017	Mangharam; Rahul	G06N5/025	1/1
*	M	US-20180152023-A1	05-2018	Guruprasad; Ranjini B.	H02J3/38	1/1

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
*	N	AU-2014101324-A4	12-2014	AU	TAYLOR N	
*	O	WO-2015077378-A1	05-2015	WO	HANKE T	G06Q20/0655
*	P	AU-2016100178-A4	03-2016	AU	TERRY G M	
*	Q	AU-2016100394-A4	05-2016	AU	MCALISTER G	
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
*	U	• YOUTUBE. "Using Natural Gas To Mine Bitcoin With Matthew Lohstroh." (18 September 2019). Retrieved online 04/16/2022. https://www.youtube.com/watch?v=TYpsZzlevow (Year: 2019)
*	V	• WayBack Machine. "New Century Exploration." (2022). Retrieved online 04/16/2022. https://web.archive.org/web/20220401000000*/https://www.newcenturyexp.com/ (Year: 2022)
*	W	• WayBack Machine. "New Century Exploration – What We Do." (2022). Retrieved online 04/16/2022. https://web.archive.org/web/20220330234542/https://www.newcenturyexp.com/ (Year: 2022)
*	X	• YOUTUBE. "Why is natural gas flared? What is the solution?" (23 July 2015). Retrieved online 04/17/2022. https://www.youtube.com/watch?v=4_vEUnlOAs8 (Year: 2015)

*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. 16/484,728	Applicant(s)/Patent Under Reexamination Barbour, Stephen	
	Examiner JAMES A REAGAN	Art Unit 3688	Page 2 of 4

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20180351367-A1	12-2018	KOGO; Takuma	G05B19/042	1/1
*	B	US-20180042064-A1	02-2018	Norton; Mark	H05B47/20	1/1
*	C	US-20170243290-A1	08-2017	Brown; Michael Sean	G06Q30/0202	1/1
*	D	US-9630614-B1	04-2017	Hill; William McGinley	F02B63/047	1/1
*	E	US-20150316903-A1	11-2015	Asmus; Matthew J.	G06Q10/06	700/291
*	F	US-20170302077-A1	10-2017	YABE; Masaaki	H02J3/005	1/1
*	G	US-20150012622-A1	01-2015	Omatsu; Fumio	G06Q10/10	709/220
*	H	US-20120185414-A1	07-2012	Pyle; Richard	G01W1/10	706/11
*	I	US-20140324237-A1	10-2014	Oe; Ryuji	G06Q40/00	700/287
*	J	US-20130138468-A1	05-2013	OE; Ryuji	G06Q50/06	705/7.22
*	K	US-20100332272-A1	12-2010	Ong; Jiun Keat	F03D17/00	705/7.36
*	L	US-20100319747-A1	12-2010	Wong; Mark Y.	H01L35/30	136/201
*	M	US-20020120412-A1	08-2002	Hayashi, Yoshiharu	H02J3/00	702/61

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
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*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Notice of References Cited	Application/Control No. 16/484,728	Applicant(s)/Patent Under Reexamination Barbour, Stephen	
	Examiner JAMES A REAGAN	Art Unit 3688	Page 3 of 4

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20190063252-A1	02-2019	Spears; Christopher Steele	H05K7/1498	1/1
*	B	US-20190042990-A1	02-2019	Paul; Topon	G06Q10/0637	1/1
*	C	US-20140096837-A1	04-2014	Belady; Christian L.	F16L55/0333	138/26
*	D	US-8849469-B2	09-2014	Belady; Christian L.	G06Q30/04	700/297
*	E	US-20080135238-A1	06-2008	Cugnet; Matt	E21B41/005	166/256
*	F	US-20160261685-A1	09-2016	Chen; YuLing	H04W12/35	1/1
*	G	US-11163280-B2	11-2021	Henson; David	A01G9/26	1/1
*	H	US-10367353-B1	07-2019	McNamara; Michael T.	G06F1/3206	1/1
*	I	US-20200073466-A1	03-2020	Walsh; Sean	G06Q20/127	1/1
*	J	US-20200341439-A1	10-2020	Valin; David	H02S40/44	1/1
*	K	US-20200395761-A1	12-2020	Walsh; Sean	H02J3/381	1/1
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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

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Notice of References Cited	Application/Control No. 16/484,728	Applicant(s)/Patent Under Reexamination Barbour, Stephen	
	Examiner JAMES A REAGAN	Art Unit 3688	Page 4 of 4

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
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*	B	US-20150337218-A1	11-2015	Ricotta; Joseph A.	C10G53/02	208/187
*	C	US-20170358041-A1	12-2017	Forbes, Jr.; Joseph W.	H02J3/008	1/1
*	D	US-20180109541-A1	04-2018	Gleichauf; Paul Harry	H04W12/06	1/1
*	E	US-10291627-B2	05-2019	Gleichauf; Paul Harry	H04W12/06	1/1
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*	H	US-7525207-B2	04-2009	Clidaras; Jimmy	F03B13/20	290/43
*	I	US-9155230-B2	10-2015	Eriksen; André Sloth	H05K7/20781	1/1
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*	K	US-8683823-B1	04-2014	Shivers, III; Robert Magee	F25J1/0283	114/230.17
*	L	US-9493216-B2	11-2016	Scott; Edward	F17C9/00	1/1
*	M	US-20150321739-A1	11-2015	Dehlsen; James G.P.	B63G8/001	165/45

FOREIGN PATENT DOCUMENTS

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

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/484,728	Barbour, Stephen
	Examiner	Art Unit
	JAMES A REAGAN	3688

CPC - Searched*		
Symbol	**Date**	**Examiner**
(G06Q50/06 OR E21B41/00 OR F02M21/0209 OR F02M21/0218 OR G05B15/02 OR G06F16/2315 OR G06Q10/06313 OR H04L67/104 OR H04L67/1097 OR G06Q2220/00 OR H02J9/06 OR G06Q10/06).cpc. Further limited by keyword and text searching in PE2E Search Tool	04/17/2022	JAR
(G06Q50/06 OR E21B41/00 OR F02M21/0209 OR F02M21/0218 OR G05B15/02 OR G06F16/2315 OR G06Q10/06313 OR H04L67/104 OR H04L67/1097 OR G06Q2220/00 OR H02J9/06 OR G06Q10/06).cpc. Further limited by keyword and text searching in PE2E Search Tool	08/21/2022	JAR

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.

/JAMES A REAGAN/ Primary Examiner, Art Unit 3688	

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/484,728	Barbour, Stephen
	Examiner	Art Unit
	JAMES A REAGAN	3688

Search Notes		
Search Notes	**Date**	**Examiner**
Reviewed IDS in PE2E Search Tool	04/17/2022	JAR
Inventor and Assignee name search in PE2E Search Tool	04/17/2022	JAR
Forward/Backward search in PE2E Search Tool	04/17/2022	JAR
PE2E Search Tool, GOOGLE, GOOGLE PATENTS, BING, DUCKDUCKGO, GOOGLE SCHOLAR, IP.COM, DIALOG	04/17/2022	JAR
Reviewed IDS in PE2E Search Tool	08/21/2022	JAR
Inventor and Assignee name search in PE2E Search Tool	08/21/2022	JAR
Forward/Backward search in PE2E Search Tool	08/21/2022	JAR
PE2E Search Tool, GOOGLE, GOOGLE PATENTS, BING, DUCKDUCKGO, GOOGLE SCHOLAR, IP.COM, DIALOG	08/21/2022	JAR

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
PE2E	Interference	08/21/2022	JAR

/JAMES A REAGAN/ Primary Examiner, Art Unit 3688	

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/484,728	Barbour, Stephen
	Examiner	**Art Unit**
	JAMES A REAGAN	3688

CPC						
Symbol					**Type**	**Version**
G06Q	/	50	/	06	F	2013-01-01
G06F	/	16	/	2315	I	2019-01-01
E21B	/	41	/	00	I	2013-01-01
F02M	/	21	/	0209	I	2013-01-01
F02M	/	21	/	0218	I	2013-01-01
G05B	/	15	/	02	I	2013-01-01
G06Q	/	10	/	06313	I	2013-01-01
H04L	/	67	/	104	I	2013-01-01
H04L	/	67	/	1097	I	2013-01-01
G06Q	/	2220	/	00	A	2013-01-01
H02J	/	9	/	06	A	2013-01-01

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	41	
/JAMES A REAGAN/ Primary Examiner, Art Unit 3688	22 August 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20220821

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/484,728	Barbour, Stephen
	Examiner	**Art Unit**
	JAMES A REAGAN	3688

INTERNATIONAL CLASSIFICATION					
CLAIMED					
G06Q	/	30	/	00	

NON-CLAIMED					
	/		/		

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

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

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	41	
/JAMES A REAGAN/ Primary Examiner, Art Unit 3688	22 August 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20220821

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/484,728	Barbour, Stephen
	Examiner	**Art Unit**
	JAMES A REAGAN	3688

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	x	10	16	19	28	28	37	37						
2	2	x	11	17	20	29	29	38	38						
3	3	10	12	18	21	30	30	39	39						
4	4	11	13	19	22	31	31	40	40						
5	5	x	14	20	23	32	32	41	41						
6	6	12	15	24	24	33	33	21	42						
7	7	13	16	25	25	34	34	22	43						
8	8	14	17	27	26	35	35	23	44						
9	9	15	18	26	27	36	36								

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	41	
/JAMES A REAGAN/ Primary Examiner, Art Unit 3688	22 August 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20220821

Bibliographic Data

Application No: 16/484,728

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /JAMES A REAGAN/ (Examiner's Signature) | (Initials)

Title: BLOCKCHAIN MINE AT OIL OR GAS FACILITY

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
01/06/2020	705	3688	91A-3US
RULE			

APPLICANTS

Upstream Data Inc., Lloydminster, CANADA

INVENTORS

Stephen Barbour, Lloydminster, CANADA

CONTINUING DATA

This application is a 371 of PCT/CA2018/050135 02/06/2018

PCT/CA2018/050135 has PRO of 62456380 02/08/2017

FOREIGN APPLICATIONS

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Patents (bitcoin blockchain mining oil field natural gas flare waste) before:pri

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System and Method for Oil and Condensate Processing



US · US20180274347A1 · Joseph A. Riotto · KATA Systems LLC

Priority 2014-05-20 · Filed 2018-05-25 · Published 2018-09-27

A system and method for the on-site separating and treating of a hydrocarbon liquid stream at an oil and gas production site is disclosed. The system comprises an oil and condensate distillation unit and a vapor recovery unit. In one embodiment, the oil and condensate distillation unit operates at ...

Naturalist smellscapes and environmental justice

Google Scholar · www.academia.edu · Hsu H · American Literature

Published 2016

... Although Norris only mentions this art studio's **gas** leak in ... unit for comparison or a common **field** within which to arrange ... with the stronger odours of linseed **oil** and sour, stale French ...

Crazy in Berlin: a novel

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Published 2017

... Other pioneers in the **field** include Fujitsu FEELthym , a ... to track **bitcoin**, the Internet-based currency, but has **natural** ... the biggest consumer of **oil** and to have a larger **gas** market than the ...

General environmental hazards in agriculture communities

Google Scholar · scholar.google.com · Donham K · Agricultural Medicine

Published 2016

Politics of the Imagination: The Life, Work and Ideas of Charles Fort

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Published 2009

... Our world has two sets of **natural** laws. One set tells us ... many such incidents occur in any **field**, they are still nowhere ... reference, does not see "**gas** lights and kerosene lamps and electric ...

Michael Watts

Google Scholar · repub.eur.nl · Arsel M · Development and Change

Published 2009

... National **oil** production (crude and **natural gas** liquids) is ... massive Bonga **oil field** --- Nigeria's largest **oil field**, lying within ... of the world **flare** emissions -- after a half century of **oil** and **gas** ...

Sustainable manure management

Google Scholar · sprints.nwisrl.ars.usda.gov · Leytem A · Sustainable animal agriculture
Published 2013
... in the production of pyrolysis **oil** and a low-BTU **gas**), gasification (... it for energy generation or **flare** the CH4 help mitigate this ... Anaerobic digestion is a **natural** biological process by which ...

Plain Talk About Drinking Water

Google Scholar · books.google.com · Symons J
Published 2011
... find related information, 3) details about **natural** chemicals found in source waters, and 4) a ... it'sa **gas** that turns to liquid when it touches cold air. In liquid form, it defies gravity. It's one of ...

Escaping God's Closet: The Revelations of a Queer Priest

Google Scholar · books.google.com · Mayers B
Published 2012
... that what I did with it was **natural** but forbidden, did not sit well ... My father would pick up his **gas** mask and a black steel ... It was, we later learned, an air mine that, following the **flare**, had ...

Daybreak Zero

Google Scholar · scholar.google.com · Barnes J
Published 2011

Operation Shakespeare: The True Story of an Elite International Sting

Google Scholar · books.google.com · Shiffman J
Published 2014
... sudden insurgent signals: a **flare** launch, blinking lights from a ... accompany undercover agents into the **field**, an unusual trait ... 500,000 injectors of a nerve **gas** antidote to the Iraqi army. A ...

Ground Up: A Novel

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Published 2009

Major On-going Cases with Information Concealment Practice

Google Scholar · link.springer.com · Chernov D · Man-made Catastrophes and Risk Information Concealment
Published 2016
... of **natural gas** before 2020 7 and net exporter of **oil** and **gas** ... of shale **oil** from depleted conventional fields) to **flare** around ... recoverable from a potential **oil** or **gas field**--estimates made ...

Relationship Between Minerals and Human

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... **mining** from the depths under the land and even seabed. ... **Oil** is indispensible for transportation and **natural gas** is ... Since around 1960, there has been a revolution in the **field** of various ...

Factors influencing the development and reform of the upstream **oil** and **gas** fiscal systems in the UK and Nigeria--a comparative study

Google Scholar · eprints.bournemouth.ac.uk · Miller A
Published 2003
... , is a royalty/tax system operated on a **field** by **field** basis. This requires a high level of expertise on ... However, the story of Nigeria's **natural gas** reserves is rather different (and deserves a ...

Chattanooga shale: uranium recovery by in situ processing

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Published 1977
... shale in the laboratory to determine **oil**, **gas**, and spent shale ... -bearing formations that have enough **natural** permf abili ty. ... of a small central portion of such a **field**, in which ignition and ...

55 Ways to the wilderness in southcentral Alaska

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Published 1994
... we look out and we see the **natural** world and we know what it is ... Although we **field**-check trips every few years, conditions ... alarms); the common highway **flare** used by motorists has also ...

Unwanted guest

Google Scholar › commons.emich.edu › Mitts A
Published 2014
... Armor thins to solar **flare** seething purple burst Thirst, fugitive morsel drifting violet lagoon Barnacle me, my ... mutually hollow trading a sudden **flare** from solar cavities slowly merging ...

The education of Green Lantern: culture and ideology

Google Scholar › search.proquest.com › Moore J › The Journal of American Culture
Published 2003
... Lantern is temporarily rendered powerless by the **gas** fumes from canisters being ... **oil** on those deboarding the plane. Senator Jeremiah Clutcher's face is covered with the thick, black **oil**. ...

Economic Evaluation of Magnesite Deposits of Khuzdar, Balochistan, Pakistan

Google Scholar › www.uok.edu.pk › Bashir E › Karachi University Journal of Science
Published 2008
... Minerals are one of the principal **natural** resources essential for ... Recently the **mining** activities are increased but their exact ... and logistic support during **field** work. We sincerely thank the ...

Tag Archives: France

Google Scholar › theoriot.wordpress.com › al-Qathafi M › The New York Times
Published 2003
... **Field**, the biggest American air base outside the United States. Even the exploitation of vast **oil** ... the Mediterranean Sea, and the **mining** of **natural gas** discovered in the Syrian territory ...

Best of the West 2011: New Stories from the Wide Side of the Missouri

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... memories of the time he was once held up at a **gas** station. ... cyanide and arsenic heap-leach **mining**--past the charred and ... at a time, reclearing the **field** each spring and summer while ...

TIMES

Google Scholar › www.queenstimes.com › Schumer U
Published 1965
... that the United States will ban imports of Russian **oil**, **natural gas**, and coal, New York Attorney Letitia James warned **oil** companies and **gas** stations that price gouging is illegal and ...

Ford at Trafford Park

Google Scholar › search.proquest.com › McIntosh I › PQDT-Global
Published 1992
... within the context of industrial capitalism:the **natural** counterpart to 'mass production'. ... of steam and **gas** engines, steam turbines and every product of electrical engineering.Themain ...

The Appalachian Trail hiker: Trail-proven advice for hikes of any length

Google Scholar › scholar.google.com › Logue V
Published 2004

Cosmonaut Keep

Google Scholar › scholar.google.com › MacLeod K
Published 2002

Don du sang à Melle

Google Scholar › blogs.paysmelois.org › Vergnault J
Published 2012
G., they will be able to play them in the living room at no additional cost. Most of the application can be downloaded free of cost and to make game lovers it's like a cherry on the food. ...

Kingdoms of experience: Everest, the unclimbed ridge

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Published 2003

An X-Ray into the Exo-Prosthetic Superbody

Google Scholar › link.springer.com › Durdenhoeffer L › Anatomy of the Superhero Film

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This chapter elaborates on the exo-prosthetic somatotype, which features the expulsion of the superhero's organs, fluids, skeletal structures, or their objective correlatives into remote ...

John E Kennedy Space Center

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Published 1974
... CEC Model 104 mass spectrometer with **gas** chromatograph interface, and a CEC Model ... the coating under conditions more severe than ordinary **field** conditions. In most instances, flat 4...

A Ghost in the Music

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Published 1996

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Published 2005

Islam Outside the Arab World

Google Scholar • www.tandfonline.com • Malik I • Asian Affairs
Published 2001
... exploitation of a significant **natural** resource, **oil**, in the Muslim ... either: it is a **field** for endless anthropological and religious ... , of enormous new **oil** and **gas** reserves within the Caspian. ...

Sex, Surrealism, Dalí and Me: The Memoirs of Carlos Lozano

Google Scholar • books.google.com • Thurlow C
Published 2000
... There was a dash of patchouli **oil** on my temples and a whisper of kohl about my eyes. ... 'Patchouli **oil**,' Dali told her and I was amazed that he should know, as I would always be amazed ...

Patent TW310421B

~~TW~~ • TW310421B • Matsushita Electric Ind Co Ltd
Priority 1993-07-27 • Filed 1995-01-26 • Granted 1997-07-11 • Published 1997-07-11
Printed by the Industrial and Consumer Cooperative of the Central Standardization Bureau of the Ministry of Economic Affairs and applied for a patent Fan 1 -Seed light basket set • It has:-Base 1 Mao _ segment, which can be recorded in the bed logic with the presence of ja and ji pen The star # 中 ...

Children of the Ghetto: Being Pictures of a Peculiar People

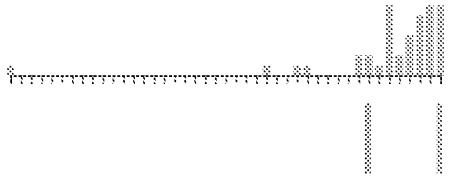
Google Scholar • books.google.com • Zangwill I
Published 1892
... -marked epoch to invest in new everythings from ~~oil~~-cloth to cups and saucers. Especially was ... The single jet of **gas**-light depending from the ceiling flared upon the strange simian faces, ...

Toronto, capital of Ukraine: the ends of desire and the beginning of history in Janice Kulyk Keefer's The Green Library

Google Scholar • ojs.lib.uwo.ca • Babiak P • ESC: English Studies in Canada
Published 2003
... that have been shuffled off the **field**, thus turning our literary ... holes in the ground, like **garbage**? When we have looked on in ... When the horse died of **natural** causes Oleg taunted the ...

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Top 1000 results by filing date



Relative count of top 5 values

Assignees	Inventors	CPCs
KATA Systems LLC		2.3%
Matsushita Electric Ind Co Ltd		2.3%

Patents (Blockchain distributed ledger cryptocurrency mine mining verificatic

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Blockchain in the electricity market: identification and analysis of business models

Google Scholar · opensiooess.nhh.no · Orlov A

Published 2017

... , **oil** and **gas** pipelines in coastal areas as well as **power** lines ... technologies falling within the field of **distributed generation**. ... On the road, **electric** or hybrid vehicles are a growing market ...

Provenance and authentication of oracle sensor data with block chain lightweight wireless network authentication scheme for constrained oracle sensors

Google Scholar · library2.smu.ca · Gordon G

Published 2017

... and refinement processes in the **oil** and **gas** industry. However, ... 's battery **power** due to the excessive **power** consumption ... yet verifiable, peer maintained **ledger**, allowing each node to ...

Geofence information delivery systems and methods

WO · WO2016196426A1 · Benjamin T JONES · GeoFrenzy, Inc.

Priority 2015-06-02 · Filed 2016-05-31 · Published 2016-12-08

The present invention is directed to methods and systems for enforcing at least one rule within a geofence, querying a database of geofences, requesting information from a mobile device about geofences based upon location services for the mobile device, and managing real estate titles and ...

Bitcoin IPO, ETF, and crowdfunding

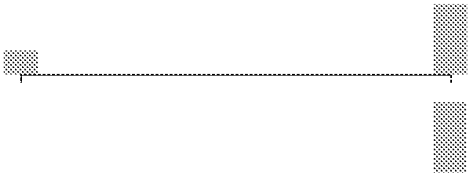
Google Scholar · www.sciencedirect.com · Bhaskar N · Handbook of Digital Currency

Published 2015

... segment in investments in **oil** and **gas** exploration in the ... of computing processing **power** to the Bitcoin **verification** and ... viewed as the future of next-**generation** crowd sales. Swarm also ...

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Assignees	Inventors	CPCs
GeoFrenzy, Inc.		25%

Patents (blockchain mining oil field natural gas flare waste) before:priority:20

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System and Method for Oil and Condensate Processing

US · US20180274347A1 · Joseph A. Riotto · KATA Systems LLC
Priority 2014-05-20 · Filed 2018-05-25 · Published 2018-09-27
A system and method for the on-site separating and treating of a hydrocarbon liquid stream at an oil and gas production site is disclosed. The system comprises an oil and condensate distillation unit and a vapor recovery unit. In one embodiment, the oil and condensate distillation unit operates at ...

The Myth Gap: What Happens when Evidence and Arguments Aren't Enough?

Google Scholar · scholar.google.com · Evans A
Published 2017

Naturalist smellscapes and environmental justice

Google Scholar · www.academia.edu · Hsu H · American Literature
Published 2016
... asserting a unit for comparison or a common **field** within which to arrange specificities, but ... odor of **gas**, of old walls, dusty plaster, and over it all the heavy, sour smell of **garbage**—a ...

Crazy in Berlin: a novel

Google Scholar · scholar.google.com · Berger T
Published 2013

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Julie & Julia: My year of cooking dangerously

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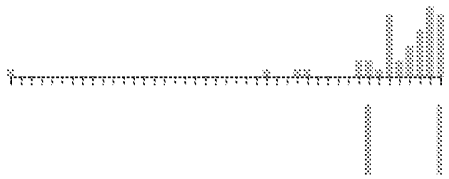
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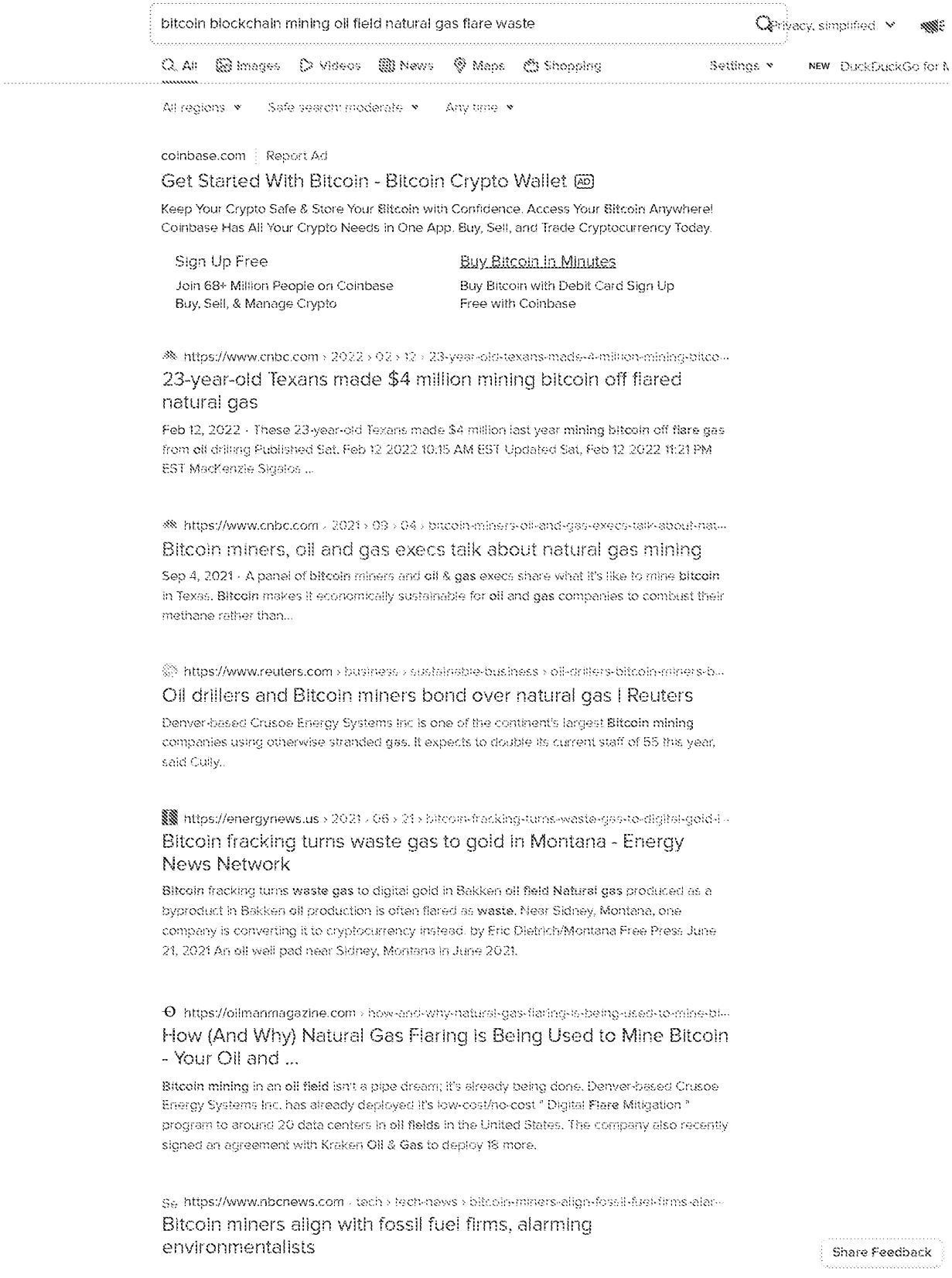
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Bitcoin makes it economically sustainable for **oil** and **gas** companies to combust their methane rather than externally combust it with a **flare**. "There is no such thing as stranded **gas** anymore," said Haby. But Ortoli has taken years to convince people that parking a trailer full of ASICs on an **oil** and **gas field** is a smart and financially sound idea.

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Oil field miners operate near or at well heads where **oil** or **natural gas** liquids are produced and dry **natural gas** is generated as a **waste** product. This **natural gas** cannot be econom- ically brought to market and is therefore either vented or flared.

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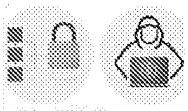
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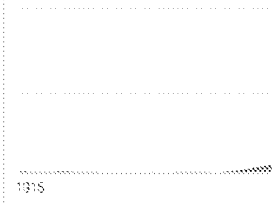
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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	11	((("BARBOUR") near3 ("Stephen"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/04/15 10:20 AM
L2	0	((("UPSTREAM") near3 ("DATA") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2022/04/15 10:21 AM
L3	44658	(G06Q50/06 OR E21B41/00 OR F02M21/0209 OR F02M21/0218 OR G05B15/02 OR G06F16/2315 OR G06Q10/06313 OR H04L67/104 OR H04L67/1097 OR G06Q2220/00 OR H02J9/06 OR G06Q10/06).cpc.	(USPAT)	OR	ON	ON	2022/04/15 10:21 AM
L5	4	1 AND (blockchain OR block$chain OR "block chain")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/15 10:22 AM
L6	5672	3 AND (blockchain OR block$chain OR "block chain")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/15 10:22 AM
L7	159	3 AND (blockchain OR block$chain OR "block chain") AND oil AND "natural gas"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/15 10:22 AM
L8	130	3 AND (blockchain OR block$chain OR "block chain") AND oil AND "natural gas" AND min$3	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/15 10:23 AM
L9	15	("7525207" | "7742830" | "8683823" | "8832476" | "8849469" | "9100089" | "9310855" | "9342375" | "9383791" | "20130160059" | "20140096837" | "20150321739").pn. OR ("10822992").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/15 12:57 PM
L10	2	"20080135238"	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/04/16 07:47 AM
L11	2	"20080135238"	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	ON	ON	2022/04/16 07:47 AM

L12	3	"20160261685"	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	ON	ON	2022/04/16 07:47 AM
L13	46	("20030196798" OR "20040239499" OR "20050179263" OR "20080135238" OR "20090107671" OR "20100038907" OR "20110199862" OR "20130002443" OR "20130065669" OR "20130112419" OR "20130166455" OR "20130245947" OR "20140237611" OR "20140237614" OR "20140316984" OR "20150261269" OR "20150262139" OR "20150292303" OR "20150294308" OR "20150310424" OR "20150310476" OR "20150356524" OR "20150358943" OR "20150369013" OR "20160010445" OR "20160052814" OR "20160109122" OR "20160112200" OR "20160125040" OR "20160164672" OR "20160214715" OR "20160218879" OR "20160261404" OR "20160261685" OR "20160283920" OR "20160300234" OR "20160319653" OR "20160328713" OR "20160330031" OR "20160330035" OR "20160342977" OR "20160362954" OR "7542947" OR "8156206" OR "8483715" OR "9495668").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/16 07:55 AM
L14	6	("20120077427" OR "20120300291" OR "20120300391" OR "20160128238" OR "20170280594" OR "20200040272").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/16 07:56 AM
L15	46	("20030196798" OR "20040239499" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/16 07:56 AM

		"20050179263" OR "20080135238" OR "20090107671" OR "20100038907" OR "20110199862" OR "20130002443" OR "20130065669" OR "20130112419" OR "20130166455" OR "20130245947" OR "20140237611" OR "20140237614" OR "20140316984" OR "20150261269" OR "20150262139" OR "20150292303" OR "20150294308" OR "20150310424" OR "20150310476" OR "20150356524" OR "20150358943" OR "20150369013" OR "20160010445" OR "20160052814" OR "20160109122" OR "20160112200" OR "20160125040" OR "20160164672" OR "20160214715" OR "20160218879" OR "20160261404" OR "20160261685" OR "20160283920" OR "20160300234" OR "20160319653" OR "20160328713" OR "20160330031" OR "20160330035" OR "20160342977" OR "20160362954" OR "7542947" OR "8156206" OR "8483715" OR "9495668").pn.					
L16	8	((US-20190063252-A1 OR US-20190042990-A1 OR US-20140096837-A1 OR US-20080135238-A1 OR US-20160261685-A1).did. AND PGPB.dbnm.) OR ((US-8849469-B2).did. AND USPT.dbnm.) OR ((US-20080135238-A1 OR US-20160261685-A1).did. AND DWPI.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/16 09:06 AM

L17	6	16 AND block$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/16 09:06 AM
L18	1	16 AND block$chain	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/16 09:06 AM
L19	132	13 OR 14 OR 15	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/16 09:07 AM
L20	1	19 AND (blockchain OR block$chain OR "block chain") AND oil AND "natural gas" AND min$3	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:07 AM
L21	17	19 AND (blockchain OR block$chain OR "block chain") AND min$3	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:08 AM
L22	1	19 AND (blockchain OR block$chain OR "block chain") AND (oil OR "natural gas")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:11 AM
L23	4	("2020/0040272").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/16 09:11 AM
L24	128	("5142672" | "5367669" | "5913046" | "6288456" | "6633823" | "7143300" | "7376851" | "7647516" | "7702931" | "7779276" | "7861102" | "7921315" | "7970561" | "8001403" | "8006108" | "8214843" | "8260913" | "8374928" | "8447993" | "8571820" | "8627123" | "8639392" | "8700929" | "8706915" | "8719223" | "8789061" | "8799690" | "9003211" | "9003216" | "9026814" | "9027024" | "9143392" | "9207993" | "9218035"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/16 09:11 AM

		| "9282022" | "9542231" | "9552234" | "9645596" | "9994118" | "10367353" | "10367535" | "10444818" | "10452127" | "10452532" | "10497072" | "10608433" | "10618427" | "10637353" | "20020072868" | "20020158749" | "20030023885" | "20030037150" | "20030074464" | "20040117330" | "20050203761" | "20060161765" | "20080030078" | "20080094797" | "20090055665" | "20090070611" | "20090078401" | "20090089595" | "20090216910" | "20100211810" | "20100235004" | "20100280675" | "20100328849" | "20110072289" | "20110238342" | "20110239010" | "20120000121" | "20120072745" | "20120300524" | "20120306271" | "20120324259" | "20130006401" | "20130063991" | "20130086404" | "20130117621" | "20130187464" | "20130227139" | "20130304903" | "20130306276" | "20140070756" | "20140137468" | "20140180886" | "20140379156" | "20150012113" | "20150121113" | "20150155712" | "20150212122" | "20150229227" | "20150277410" | "20150278968" |					

		"20150288183" | "20150372538" | "20160006066" | "20160011617" | "20160043552" | "20160126783" | "20160170469" | "20160172900" | "20160187906" | "20160198656" | "20160212954" | "20160248631" | "20160324077" | "20170023969" | "20170104336" | "20170261949" | "20170373500" | "20180026478" | "20180144414" | "20180202825" | "20180240112" | "20180366978" | "20180367320" | "20190052094" | "20190168630" | "20190258307" | "20190280521" | "20190318327" | "20190324820" | "20200040272" | "20200051184" | "20200073466" | "20200136387" | "20200136388").pn. OR ("11163280").urpn. AND (PGPB | USPT | USOC).dbnm.					
L25	9	24 AND (blockchain OR block$chain OR "block chain") AND (oil OR "natural gas")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:12 AM
L26	65	("6288456" | "6633823" | "7143300" | "7647516" | "7702931" | "7779276" | "7861102" | "7921315" | "7970561" | "8001403" | "8006108" | "8214843" | "8374928" | "8447993" | "8571820" | "8627123" | "8789061" | "8799690" | "9003211" | "9003216" | "9026814" | "9207993" | "9218035" | "9552234" | "20080030078" | "20080094797" | "20090055665" | "20100211810" |	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/16 09:12 AM

		"20100328849" | "20110238342" | "20120000121" | "20120072745" | "20120300524" | "20130006401" | "20130063991" | "20130086404" | "20130187464" | "20130306276" | "20140137468" | "20140379156" | "20150155712" | "20150229227" | "20160198656" | "20160212954" | "20160324077" | "20170104336" | "20180144414").pn. OR ("10367353").urpn. AND (PGPB | USPT | USOC).dbnm.					
L27	18	26 AND (blockchain OR block$chain OR "block chain") AND (oil OR "natural gas")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:12 AM
L28	2615	(blockchain OR block$chain OR "block chain") AND (oil OR "natural gas")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:13 AM
L29	156	28 AND (blockchain OR block$chain OR "block chain") AND ((oil OR "natural gas") SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:13 AM
L30	0	28 AND (blockchain OR block$chain OR "block chain") AND ((oil OR "natural gas") SAME generator SAME server SAME mining)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:14 AM
L31	5	28 AND ((blockchain OR block$chain OR "block chain") SAME server SAME mining) AND ((oil OR "natural gas") SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:14 AM
L32	36	28 AND ((blockchain OR block$chain OR "block chain") SAME server SAME mining) AND ((oil OR "natural gas"))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:15 AM
L33	22	28 AND ((blockchain OR block$chain OR "block chain") SAME	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:16 AM

		server SAME mining) AND (generator)					
L34	121	((blockchain OR block$chain OR "block chain") SAME server SAME mining) AND (generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:16 AM
L35	1024	((blockchain OR block$chain OR "block chain") SAME mining) AND (generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:19 AM
L36	42	((blockchain OR block$chain OR "block chain") SAME mining) AND (generator WITH gas)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:19 AM
L37	439	((blockchain OR block$chain OR "block chain" OR "distributed ledger") SAME mining SAME server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:22 AM
L38	6	37 AND (server SAME electric$4 SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:22 AM
L39	8	37 AND (server SAME (electric$4 OR power) SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:24 AM
L40	176	37 AND (server SAME (electric$4 OR power))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:25 AM
L41	717	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME mining SAME server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:26 AM
L42	9	41 AND (server SAME electric$4 SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:27 AM
L43	3	"9982516"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:27 AM
L44	2	"20150337218"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:28 AM
L45	107	41 AND (vented OR flared OR wast$4) AND (natural OR methane OR gas)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:34 AM
L46	9	41 AND (server SAME electric$4 SAME power SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:37 AM
L47	4507	((blockchain OR	(US-PGPUB; USPAT;	OR	ON	ON	2022/04/16

		block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME mining)	EPO; JPO)				09:38 AM
L48	17	47 AND (server SAME electric$4 SAME power SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:38 AM
L49	4765	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 10:05 AM
L50	17	49 AND (server SAME electric$4 SAME power SAME (generator OR genereation))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 10:06 AM
L51	39	49 AND ((computer OR server) SAME electric$4 SAME power SAME (generator OR genereation))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 10:06 AM
L52	156	49 AND ((computer OR server) SAME (electric$4 OR power) SAME (generator OR genereation))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 10:06 AM
L53	738	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining) SAME server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:24 AM
L54	10	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining) SAME server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:24 AM

L55	339	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining)) AND (server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:25 AM
L56	952	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:27 AM
L57	98	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) SAME (server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:27 AM
L58	85	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME (power WITH generator))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:28 AM
L59	39	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:30 AM

		cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME (electric$4 WITH generator))					
L60	33	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME ((portable OR mobile) WITH generator))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:31 AM
L61	4045	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) WITH (server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:31 AM
L62	1936	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) WITH (mine OR mining OR verify OR verification OR verifying)) WITH (server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:32 AM
L63	58	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) WITH (mine OR mining) SAME (verify OR verification OR verifying)) WITH (server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:32 AM

L64	97	"7525207"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:34 PM
L65	2	"20140096837"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:34 PM
L66	3	"8683823"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:34 PM
L67	4	"9100089"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:35 PM
L68	1	"20150321739"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:35 PM
L69	156	49 AND ((computer OR server) SAME (electric$4 OR power) SAME (generator OR generetion))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:39 PM
L70	102	69 AND ("natural gas", OR methane OR flare OR burn$3 OR waste biogas)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:42 PM
L71	1	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) WITH (mine OR mining) SAME (verify OR verification OR verifying)) WITH (server)	(EPO; JPO)	OR	ON	ON	2022/04/16 02:42 PM
L72	1	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining) (verify OR verification OR verifying)) (server)	(EPO; JPO)	SAME	ON	ON	2022/04/16 02:43 PM
L73	13	(blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining)	(EPO; JPO)	SAME	ON	ON	2022/04/16 02:43 PM
L74	14	(blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR	(EPO; JPO)	AND	ON	ON	2022/04/16 02:44 PM

		cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining)					
L75	892	(blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining)	(FPRS; EPO; JPO)	AND	ON	ON	2022/04/16 02:44 PM
L76	23	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining) (verify OR verification OR verifying)) (server)	(FPRS; EPO; JPO)	SAME	ON	ON	2022/04/16 02:44 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	11	((("BARBOUR") near3 ("Stephen"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/04/15 10:20 AM
L2	0	((("UPSTREAM") near3 ("DATA") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2022/04/15 10:21 AM
L3	44658	(G06Q50/06 OR E21B41/00 OR F02M21/0209 OR F02M21/0218 OR G05B15/02 OR G06F16/2315 OR G06Q10/06313 OR H04L67/104 OR H04L67/1097 OR G06Q2220/00 OR H02J9/06 OR G06Q10/06).cpc.	(USPAT)	OR	ON	ON	2022/04/15 10:21 AM
L5	4	1 AND (blockchain OR block$chain OR "block chain")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/15 10:22 AM
L6	5672	3 AND (blockchain OR block$chain OR "block chain")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/15 10:22 AM
L7	159	3 AND (blockchain OR block$chain OR "block chain") AND oil AND "natural gas"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/15 10:22 AM
L8	130	3 AND (blockchain OR block$chain OR "block chain") AND oil AND "natural gas" AND min$3	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/15 10:23 AM
L9	15	("7525207" | "7742830" | "8683823" | "8832476" | "8849469" | "9100089" | "9310855" | "9342375" | "9383791" | "20130160059" | "20140096837" | "20150321739").pn. OR ("10822992").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/15 12:57 PM
L10	2	"20080135238"	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/04/16 07:47 AM
L11	2	"20080135238"	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	ON	ON	2022/04/16 07:47 AM

L12	3	"20160261685"	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	ON	ON	2022/04/16 07:47 AM
L13	46	("20030196798" OR "20040239499" OR "20050179263" OR "20080135238" OR "20090107671" OR "20100038907" OR "20110199862" OR "20130002443" OR "20130065669" OR "20130112419" OR "20130166455" OR "20130245947" OR "20140237611" OR "20140237614" OR "20140316984" OR "20150261269" OR "20150262139" OR "20150292303" OR "20150294308" OR "20150310424" OR "20150310476" OR "20150356524" OR "20150358943" OR "20150369013" OR "20160010445" OR "20160052814" OR "20160109122" OR "20160112200" OR "20160125040" OR "20160164672" OR "20160214715" OR "20160218879" OR "20160261404" OR "20160261685" OR "20160283920" OR "20160300234" OR "20160319653" OR "20160328713" OR "20160330031" OR "20160330035" OR "20160342977" OR "20160362954" OR "7542947" OR "8156206" OR "8483715" OR "9495668").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/16 07:55 AM
L14	6	("20120077427" OR "20120300291" OR "20120300391" OR "20160128238" OR "20170280594" OR "20200040272").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/16 07:56 AM
L15	46	("20030196798" OR "20040239499" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/16 07:56 AM

		"20050179263" OR "20080135238" OR "20090107671" OR "20100038907" OR "20110199862" OR "20130002443" OR "20130065669" OR "20130112419" OR "20130166455" OR "20130245947" OR "20140237611" OR "20140237614" OR "20140316984" OR "20150261269" OR "20150262139" OR "20150292303" OR "20150294308" OR "20150310424" OR "20150310476" OR "20150356524" OR "20150358943" OR "20150369013" OR "20160010445" OR "20160052814" OR "20160109122" OR "20160112200" OR "20160125040" OR "20160164672" OR "20160214715" OR "20160218879" OR "20160261404" OR "20160261685" OR "20160283920" OR "20160300234" OR "20160319653" OR "20160328713" OR "20160330031" OR "20160330035" OR "20160342977" OR "20160362954" OR "7542947" OR "8156206" OR "8483715" OR "9495668").pn.					
L16	8	((US-20190063252-A1 OR US-20190042990-A1 OR US-20140096837-A1 OR US-20080135238-A1 OR US-20160261685-A1).did. AND PGPB.dbnm.) OR ((US-8849469-B2).did. AND USPT.dbnm.) OR ((US-20080135238-A1 OR US-20160261685-A1).did. AND DWPI.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/16 09:06 AM

L17	6	16 AND block$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/16 09:06 AM
L18	1	16 AND block$chain	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/16 09:06 AM
L19	132	13 OR 14 OR 15	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/16 09:07 AM
L20	1	19 AND (blockchain OR block$chain OR "block chain") AND oil AND "natural gas" AND min$3	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:07 AM
L21	17	19 AND (blockchain OR block$chain OR "block chain") AND min$3	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:08 AM
L22	1	19 AND (blockchain OR block$chain OR "block chain") AND (oil OR "natural gas")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:11 AM
L23	4	("2020/0040272").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/16 09:11 AM
L24	128	("5142672" | "5367669" | "5913046" | "6288456" | "6633823" | "7143300" | "7376851" | "7647516" | "7702931" | "7779276" | "7861102" | "7921315" | "7970561" | "8001403" | "8006108" | "8214843" | "8260913" | "8374928" | "8447993" | "8571820" | "8627123" | "8639392" | "8700929" | "8706915" | "8719223" | "8789061" | "8799690" | "9003211" | "9003216" | "9026814" | "9027024" | "9143392" | "9207993" | "9218035"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/16 09:11 AM

		| "9282022" | "9542231" | "9552234" | "9645596" | "9994118" | "10367353" | "10367535" | "10444818" | "10452127" | "10452532" | "10497072" | "10608433" | "10618427" | "10637353" | "20020072868" | "20020158749" | "20030023885" | "20030037150" | "20030074464" | "20040117330" | "20050203761" | "20060161765" | "20080030078" | "20080094797" | "20090055665" | "20090070611" | "20090078401" | "20090089595" | "20090216910" | "20100211810" | "20100235004" | "20100280675" | "20100328849" | "20110072289" | "20110238342" | "20110239010" | "20120000121" | "20120072745" | "20120300524" | "20120306271" | "20120324259" | "20130006401" | "20130063991" | "20130086404" | "20130117621" | "20130187464" | "20130227139" | "20130304903" | "20130306276" | "20140070756" | "20140137468" | "20140180886" | "20140379156" | "20150012113" | "20150121113" | "20150155712" | "20150212122" | "20150229227" | "20150277410" | "20150278968" |					

		"20150288183" | "20150372538" | "20160006066" | "20160011617" | "20160043552" | "20160126783" | "20160170469" | "20160172900" | "20160187906" | "20160198656" | "20160212954" | "20160248631" | "20160324077" | "20170023969" | "20170104336" | "20170261949" | "20170373500" | "20180026478" | "20180144414" | "20180202825" | "20180240112" | "20180366978" | "20180367320" | "20190052094" | "20190168630" | "20190258307" | "20190280521" | "20190318327" | "20190324820" | "20200040272" | "20200051184" | "20200073466" | "20200136387" | "20200136388").pn. OR ("11163280").urpn. AND (PGPB | USPT | USOC).dbnm.					
L25	9	24 AND (blockchain OR block$chain OR "block chain") AND (oil OR "natural gas")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:12 AM
L26	65	("6288456" | "6633823" | "7143300" | "7647516" | "7702931" | "7779276" | "7861102" | "7921315" | "7970561" | "8001403" | "8006108" | "8214843" | "8374928" | "8447993" | "8571820" | "8627123" | "8789061" | "8799690" | "9003211" | "9003216" | "9026814" | "9207993" | "9218035" | "9552234" | "20080030078" | "20080094797" | "20090055665" | "20100211810" |	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/16 09:12 AM

		"20100328849" | "20110238342" | "20120000121" | "20120072745" | "20120300524" | "20130006401" | "20130063991" | "20130086404" | "20130187464" | "20130306276" | "20140137468" | "20140379156" | "20150155712" | "20150229227" | "20160198656" | "20160212954" | "20160324077" | "20170104336" | "20180144414").pn. OR ("10367353").urpn. AND (PGPB | USPT | USOC).dbnm.					
L27	18	26 AND (blockchain OR block$chain OR "block chain") AND (oil OR "natural gas")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:12 AM
L28	2615	(blockchain OR block$chain OR "block chain") AND (oil OR "natural gas")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:13 AM
L29	156	28 AND (blockchain OR block$chain OR "block chain") AND ((oil OR "natural gas") SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:13 AM
L30	0	28 AND (blockchain OR block$chain OR "block chain") AND ((oil OR "natural gas") SAME generator SAME server SAME mining)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:14 AM
L31	5	28 AND ((blockchain OR block$chain OR "block chain") SAME server SAME mining) AND ((oil OR "natural gas") SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:14 AM
L32	36	28 AND ((blockchain OR block$chain OR "block chain") SAME server SAME mining) AND ((oil OR "natural gas"))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:15 AM
L33	22	28 AND ((blockchain OR block$chain OR "block chain") SAME	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:16 AM

		server SAME mining) AND (generator)					
L34	121	((blockchain OR block$chain OR "block chain") SAME server SAME mining) AND (generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:16 AM
L35	1024	((blockchain OR block$chain OR "block chain") SAME mining) AND (generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:19 AM
L36	42	((blockchain OR block$chain OR "block chain") SAME mining) AND (generator WITH gas)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:19 AM
L37	439	((blockchain OR block$chain OR "block chain" OR "distributed ledger") SAME mining SAME server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:22 AM
L38	6	37 AND (server SAME electric$4 SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:22 AM
L39	8	37 AND (server SAME (electric$4 OR power) SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:24 AM
L40	176	37 AND (server SAME (electric$4 OR power))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:25 AM
L41	717	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME mining SAME server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:26 AM
L42	9	41 AND (server SAME electric$4 SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:27 AM
L43	3	"9982516"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:27 AM
L44	2	"20150337218"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:28 AM
L45	107	41 AND (vented OR flared OR wast$4) AND (natural OR methane OR gas)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:34 AM
L46	9	41 AND (server SAME electric$4 SAME power SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:37 AM
L47	4507	((blockchain OR	(US-PGPUB; USPAT;	OR	ON	ON	2022/04/16

		block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME mining)	EPO; JPO)				09:38 AM
L48	17	47 AND (server SAME electric$4 SAME power SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:38 AM
L49	4765	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 10:05 AM
L50	17	49 AND (server SAME electric$4 SAME power SAME (generator OR genereation))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 10:06 AM
L51	39	49 AND ((computer OR server) SAME electric$4 SAME power SAME (generator OR genereation))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 10:06 AM
L52	156	49 AND ((computer OR server) SAME (electric$4 OR power) SAME (generator OR genereation))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 10:06 AM
L53	738	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining) SAME server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:24 AM
L54	10	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining) SAME server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:24 AM

L55	339	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining)) AND (server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:25 AM
L56	952	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:27 AM
L57	98	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) SAME (server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:27 AM
L58	85	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME (power WITH generator))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:28 AM
L59	39	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:30 AM

		cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME (electric$4 WITH generator))					
L60	33	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME ((portable OR mobile) WITH generator))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:31 AM
L61	4045	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) WITH (server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:31 AM
L62	1936	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) WITH (mine OR mining OR verify OR verification OR verifying)) WITH (server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:32 AM
L63	58	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) WITH (mine OR mining) SAME (verify OR verification OR verifying)) WITH (server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:32 AM

L64	97	"7525207"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:34 PM
L65	2	"20140096837"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:34 PM
L66	3	"8683823"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:34 PM
L67	4	"9100089"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:35 PM
L68	1	"20150321739"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:35 PM
L69	156	49 AND ((computer OR server) SAME (electric$4 OR power) SAME (generator OR generetion))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:39 PM
L70	102	69 AND ("natural gas", OR methane OR flare OR burn$3 OR waste biogas)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:42 PM
L71	1	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) WITH (mine OR mining) SAME (verify OR verification OR verifying)) WITH (server)	(EPO; JPO)	OR	ON	ON	2022/04/16 02:42 PM
L72	1	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining) (verify OR verification OR verifying)) (server)	(EPO; JPO)	SAME	ON	ON	2022/04/16 02:43 PM
L73	13	(blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining)	(EPO; JPO)	SAME	ON	ON	2022/04/16 02:43 PM
L74	14	(blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR	(EPO; JPO)	AND	ON	ON	2022/04/16 02:44 PM

		cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining)					
L75	892	(blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining)	(FPRS; EPO; JPO)	AND	ON	ON	2022/04/16 02:44 PM
L76	23	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining) (verify OR verification OR verifying)) (server)	(FPRS; EPO; JPO)	SAME	ON	ON	2022/04/16 02:44 PM
L77	1	("20160330031").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/21 05:06 PM
L78	246	("0585784" OR "0633823" OR "0672955" OR "0748932" OR "0930410" OR "0990593" OR "10003200" OR "10009232" OR "100130117" OR "10033210" OR "10037061" OR "10039211" OR "10063629" OR "10067547" OR "10078353" OR "10103574" OR "10128684" OR "10199669" OR "10234835" OR "10257268" OR "10271486" OR "10275842" OR "10283968" OR "10289190" OR "10326661" OR "10339227" OR "10340696" OR "10356954" OR "10368467" OR "10404523" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/21 05:07 PM

		"10452532" OR "10454772" OR "10465492" OR "10488061" OR "10497072" OR "10523449" OR "10582635" OR "10637250" OR "10637353" OR "10739042" OR "10754494" OR "10833940" OR "10882412" OR "10916967" OR "10931117" OR "10974194" OR "10993353" OR "11009836" OR "11056913" OR "11076509" OR "11126242" OR "11182781" OR "11196255" OR "11310944" OR "130328395" OR "140167504" OR "170271701" OR "20040000815" OR "20050034128" OR "20080276628" OR "20090070611" OR "20090078401" OR "20090255653" OR "20100024445" OR "20100280675" OR "20110009047" OR "20110099043" OR "20110189936" OR "20110276194" OR "20110278928" OR "20120024515" OR "20120075794" OR "20120108157" OR "20120129442" OR "20120132554" OR "20120134105" OR "20120142265" OR "20120244793" OR "20120323382" OR "20130006401" OR "20130054987" OR "20130078901" OR "20130199629" OR "20140016256" OR "20140036442" OR "20140101462" OR "20140137468" OR "20140185225" OR					

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		"7971446" OR "7990710" OR "7998227" OR "8001403" OR "8006108" OR "8031468" OR "8047904" OR "8051672" OR "8070863" OR "8080900" OR "8094436" OR "8113010" OR "8180501" OR "8184435" OR "8203837" OR "8203841" OR "8214843" OR "8233270" OR "8248795" OR "8248799" OR "8250382" OR "8251785" OR "8254122" OR "8260913" OR "8261275" OR "8264840" OR "8286442" OR "8300402" OR "8305737" OR "8312229" OR "8315054" OR "8320128" OR "8322155" OR "8331086" OR "8331087" OR "8332670" OR "8360833" OR "8370517" OR "8374928" OR "8405977" OR "8422223" OR "8432700" OR "8447993" OR "8457796" OR "8462496" OR "8498110" OR "8498114" OR "8600556" OR "8627123" OR "8639392" OR "8659895" OR "8665591" OR "8694810" OR "8700929" OR "8706914" OR "8706915" OR "8719223" OR "8734212" OR					

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L80	11	((("BARBOUR") near3 ("Stephen"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/08/21 07:33 PM
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L93	1058	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/08/21 07:33 PM
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L95	103	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME (power WITH generator))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/08/21 07:33 PM
L96	429	49 AND ((computer OR server) SAME (electric$4 OR power)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/08/21 07:35 PM

		SAME (generator OR generation))					

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	1	(hydrocarbon combustible gas generator blockchain mining peer digital currency).clm.	(US-PGPUB; USPAT)	AND	ON	ON	2022/08/21 07:42 PM

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16/484,728
Filing Date	2020-01-06
First Named Inventor	BARBOUR, Stephen
Art Unit	3688
Examiner Name	REAGAN, JAMES A
Attorney Docket Number	91A-3US

U.S. PATENTS

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
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	2	5367669	A	1994-11-22	Alexander Holland	
	3	5509434	A	1996-04-23	Charles L. Boyd	
	4	5544012	A	1996-08-06	Norihiro Koike	
	5	5586574	A	1996-12-24	Dean E. Smith	
	6	5653070	A	1997-08-05	Serge Seguin	
	7	5748914	A	1998-05-05	Richard Maurice Barth	
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	Examiner Name	REAGAN, JAMES A
	Attorney Docket Number	91A-3US

	9	6288456	B1	2001-09-11	William E. Cratty	
	10	6585784	B1	2003-07-01	Frank F. Mittricker	
	11	6633823	B2	2003-10-14	Erik J. Bartone	
	12	6672955	B2	2004-01-06	Frederic Charron	
	13	6748932	B1	2004-06-15	Richard L. Sorter	
	14	6930410	B2	2005-08-16	Masakazu Ikeda	
	15	6990593	B2	2006-01-24	O Sam Nakagawa	
	16	7042726	B2	2006-05-09	Tahir Cader	
	17	7085133	B2	2006-08-01	Shawn Anthony Hall	
	18	7093256	B2	2006-08-15	Rudolf Henricus Johannes Bloks	
	19	7143300	B2	2006-11-28	Mark R. Potter	

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	20	7196900	B2	2007-03-27	Carrel W. Ewing	
	21	7269723	B2	2007-09-11	Daryl C. Cromer	
	22	7278273	B1	2007-10-09	William H. Whitted	
	23	7370666	B2	2008-05-13	Julie Willets	
	24	7376851	B2	2008-05-20	Seo Kwang Kim	
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	27	7508663	B2	2009-03-24	Giovanni Coglitore	
	28	7516106	B2	2009-04-07	Gregory A. Ehlers	
	29	7560831	B2	2009-07-14	William Whitted	
	30	7633955	B1	2009-12-15	Nakul Pratap Saraiya	

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	31	7647516	B2	2010-01-12	Parthasarathy Ranganathan	
	32	7702931	B2	2010-04-20	Alan L. Goodrum	
	33	7724513	B2	2010-05-25	Giovanni Coglitore	
	34	7738251	B2	2010-06-15	Jimmy Clidaras	
	35	7779276	B2	2010-08-17	Joseph Edward Bolan	
	36	7854652	B2	2010-12-21	Randall A. Yates	
	37	7861102	B1	2010-12-28	Parthasarathy Ranganathan	
	38	7862410	B2	2011-01-04	Lianne M. McMahan	
	39	7921315	B2	2011-04-05	John K. Langgood	
	40	7925911	B2	2011-04-12	Thomas M. Brey	
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	43	7961463	B2	2011-06-14	Christian L. Belady	
	44	7970561	B2	2011-06-28	Clemens Pfeiffer	
	45	7971446	B2	2011-07-05	Jimmy Clidaras	
	46	7990710	B2	2011-08-02	Stephen V. R. Hellriegel	
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	48	8001403	B2	2011-08-16	James R Hamilton	
	49	8006108	B2	2011-08-23	Thomas M. Brey	
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	54	8080900	B2	2011-12-20	Selver Corhodzic	
	55	8094436	B2	2012-01-10	Patrick W. Mills	
	56	8113010	B2	2012-02-14	Andrew B. Carlson	
	57	8180501	B2	2012-05-15	Andrew J. Lewis	
	58	8184435	B2	2012-05-22	John H. Bean	
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	64	8248799	B2	2012-08-21	Yao-Ting Chang	
	65	8250382	B2	2012-08-21	Stephen C. Maglione	
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	68	8260913	B2	2012-09-04	Adam Knapp	
	69	8261275	B2	2012-09-04	Darrin P. Johnson	
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	71	8286442	B2	2012-10-16	Andrew B. Carlson	
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	75	8315054	B2	2012-11-20	Chih-Hua Chen	
	76	8320128	B2	2012-11-27	Chao-Ke Wei	
	77	8322155	B2	2012-12-04	Ozan Tutunoglu	
	78	8331086	B1	2012-12-11	Alan P. Meissner	
	79	8331087	B2	2012-12-11	Chao-Ke Wei	
	80	8332670	B2	2012-12-11	Hideharu Kato	
	81	8360833	B2	2013-01-29	Roy Grantham	
	82	8370517	B2	2013-02-05	Patrick Joseph Bohrer	
	83	8374928	B2	2013-02-12	Sandeep Gopisetty	
	84	8405977	B2	2013-03-26	Tai-Wei Lin	
	85	8422223	B2	2013-04-16	Tsung-Han Su	

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	Attorney Docket Number	91A-3US

	86	8432700	B2	2013-04-30	Yasuyuki Katakura	
	87	8447993	B2	2013-05-21	Daniel H. Greene	
	88	8457796	B2	2013-06-04	Deepinder Singh Thind	
	89	8462496	B2	2013-06-11	Ty Schmitt	
	90	8498110	B2	2013-07-30	Chao-Ke Wei	
	91	8498114	B2	2013-07-30	Valan R. Martini	
	92	8600556	B2	2013-12-03	Clay G. Nesler	
	93	8627123	B2	2014-01-07	Navendu Jain	
	94	8639392	B2	2014-01-28	David P. Chassin	
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	96	8665591	B2	2014-03-04	Richard Bourgeois	

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	98	8700929	B1	2014-04-15	Wolf-Dietrich Weber	
	99	8706914	B2	2014-04-22	David D. Duchesneau	
	100	8706915	B2	2014-04-22	David D Duchesneau	
	101	8719223	B2	2014-05-06	Adam Knapp	
	102	8734212	B2	2014-05-27	Wen-Tang Peng	
	103	8755184	B2	2014-06-17	Yonghui Peng	
	104	8768799	B1	2014-07-01	Joseph W. Forbes	
	105	8789061	B2	2014-07-22	Milan Pavel	
	106	8799690	B2	2014-08-05	Christopher J. DAWSON	
	107	8812674	B2	2014-08-19	Brian K. Guenter	

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	109	8848727	B2	2014-09-30	Nakul Pratap Saraiya	
	110	8849715	B2	2014-09-30	Joseph W. Forbes	
	111	8887498	B2	2014-11-18	Todd A. Frerichs	
	112	8917502	B1	2014-12-23	Brock R. Gardner	
	113	8924781	B2	2014-12-30	Mark E. Shaw	
	114	8931221	B2	2015-01-13	Ankit SOMANI	
	115	8941256	B1	2015-01-27	Michael P. Czamara	
	116	8964374	B1	2015-02-24	Honggang Sheng	
	117	8965594	B2	2015-02-24	David Marcus	
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	120	9026814	B2	2015-05-05	Jered Aasheim	
	121	9027024	B2	2015-05-05	Jason Mick	
	122	9041235	B1	2015-05-26	Jerry James Hunter	
	123	9059604	B2	2015-06-16	Lars Johnson	
	124	9063738	B2	2015-06-23	Navendu Jain	
	125	9065582	B2	2015-06-23	Richard A. Barry	
	126	9072200	B2	2015-06-30	Joseph M. Dersch	
	127	9091496	B2	2015-07-28	Gregory P. Imwalle	
	128	9110641	B2	2015-08-18	Wen-Jen Wu	
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	131	9144181	B2	2015-09-22	Scott Wiley	
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	134	9232024	B2	2016-01-05	David Robert SUFFLING	
	135	9252598	B2	2016-02-02	Christian L. Belady	
	136	9268613	B2	2016-02-23	Paul Barham	
	137	9271429	B2	2016-02-23	Koichi Mashiko	
	138	9282022	B2	2016-03-08	William Brad MATTHEWS	
	139	9284850	B1	2016-03-15	Brock Robert Gardner	
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	142	9342375	B2	2016-05-17	Chris D. Hyser	
	143	9345167	B2	2016-05-17	Ching-Bai Hwang	
	144	9348381	B2	2016-05-24	Lin-Zhuang Khoo	
	145	9357681	B2	2016-05-31	Peter George Ross	
	146	9365127	B2	2016-06-14	Mats Olsson	
	147	9380734	B2	2016-06-28	Yao-Ting Chang	
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	153	9447992	B2	2016-09-20	Kelly Johnson	
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	156	9542231	B2	2017-01-10	Rishi L. Khan	
	157	9552234	B2	2017-01-24	Sergey BOLDYREV	
	158	9559520	B2	2017-01-31	John Christopher Shelton	
	159	9568975	B2	2017-02-14	Naresh K. Sehgal	
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	164	9618991	B1	2017-04-11	Jimmy Clidaras	
	165	9622387	B1	2017-04-11	Michael P. Czamara	
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	167	9637433	B2	2017-05-02	Robert M Zubrin	
	168	9645596	B1	2017-05-09	Ja-Chin Audrey Lee	
	169	9654414	B2	2017-05-16	Aveek N. Chatterjee	
	170	9673632	B1	2017-06-06	Anand Ramesh	
	171	9692259	B2	2017-06-27	Gregory J. Boss	
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	174	9769953	B2	2017-09-19	Christopher G. Malone	
	175	9769960	B2	2017-09-19	Dale LeFebvre	
	176	9774190	B2	2017-09-26	Subrata K. Mondal	
	177	9778718	B2	2017-10-03	Carl Edvard Martin Zacho	
	178	9795062	B1	2017-10-17	Peter George Ross	
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	180	9800167	B2	2017-10-24	Eddy C. Aeloiza	
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	186	9994118	B2	2018-06-12	Nate Williams	
	187	9995218	B2	2018-06-12	Jared Oehring	
	188	10003200	B2	2018-06-19	Kristian Budde	
	189	10009232	B2	2018-06-26	Tyler B. Duncan	
	190	10033210	B2	2018-07-24	Eric C. Peterson	
	191	10037061	B1	2018-07-31	Rajan Panchapakesan	
	192	10039211	B2	2018-07-31	Colton Malone Crawford	
	193	10063629	B2	2018-08-28	Tyler B. Duncan	
	194	10067547	B2	2018-09-04	Enrique G. Castro-Leon	
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	197	10128684	B2	2018-11-13	Shankar Ramamurthy	
	198	10199669	B2	2019-02-05	Di Wang	
	199	10234835	B2	2019-03-19	Jie Liu	
	200	10257268	B2	2019-04-09	Andrew Brian Cencini	
	201	10271486	B2	2019-04-30	Brad MCNAMARA	
	202	10275842	B2	2019-04-30	Ja-Chin Audrey Lee	
	203	10283968	B2	2019-05-07	Mohammad N. ElBsat	
	204	10289190	B2	2019-05-14	Gregory J. Boss	
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	208	10356954	B2	2019-07-16	Yu Bao	
	209	10368467	B2	2019-07-30	Andrew Gold	
	210	10404523	B2	2019-09-03	Andrew Brian Cencini	
	211	10452532	B2	2019-10-22	Jeffrey L. McVay	
	212	10454772	B2	2019-10-22	Steven White	
	213	10465492	B2	2019-11-05	Joseph A. Ricotta	
	214	10488061	B2	2019-11-26	John Costakis	
	215	10497072	B2	2019-12-03	Ali Hooshmand	
	216	10523449	B2	2019-12-31	Rey Montalvo	
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	219	10637353	B2	2020-04-28	Soichiro Ohyama	
	220	10739042	B2	2020-08-11	Ming Zhang	
	221	10754494	B2	2020-08-25	Tyler B. Duncan	
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	232	11182781	B2	2021-11-23	Joseph B. Castinado	
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	33	20140167504	A1	2014-06-19	Shaun L. Harris	
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	39	20150167550	A1	2015-06-18	Christian Lee Vandervort	
	40	20150276253	A1	2015-10-01	Rey Montalvo	
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	49	20170265326	A1	2017-09-14	Mozan Totani	
	50	20170271701	A1	2017-09-21	Paul J. Berlowitz	
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	3	2653778	CA	A1	2007-12-13	EXAFLOP LLC		☐
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	7	102185382	CN	A	2011-09-14	SHENZHEN POWER SUPPLY BUREAU GUANGDONG GRID CO LTD		☒
	8	102541219	CN	A	2012-07-04	HONGFUJIN PREC IND SHENZHEN		☒
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	14	104144183	CN	A	2014-11-12	HITACHI LTD		☒
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	25	1167861	EP	A1	2002-01-02	TOYOTA MOTOR CO LTD		☐
	26	1490941	EP	A1	2004-12-29	ROBERTSHAW CONTROLS CO		☐
	27	2036189	EP	A2	2009-03-18	EXAFLOP LLC		☐
	28	2074337	EP	A2	2009-07-01	SUN MICROSYSTEMS INC		☐
	29	2354378	EP	A1	2011-08-10	DATAXENTER IP B V		☐
	30	2446516	EP	A2	2012-05-02	SERVER TECH INC		☐
	31	2634956	EP	A2	2013-09-04	BLACKBERRY LTD		☐
	32	3465865	EP	A1	2019-04-10	XSLENT ENERGY TECH LLC		☐
	33	2765100	ES	T3	2020-06-05	FREIGHT FARMS INC		☒
	34	2954670	FR	A1	2011-06-24	ATRIUM DATA		☒

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/484,728
	Filing Date	2020-01-06
	First Named Inventor	BARBOUR, Stephen
	Art Unit	3688
	Examiner Name	REAGAN, JAMES A
	Attorney Docket Number	91A-3US

	35	2954671	FR	A1	2011-06-24	ATRIUM DATA		☒
	36	2957163	FR	A1	2011-09-09	BULL SAS		☒
	37	2960662	FR	A1	2011-12-02	ATRIUM DATA		☒
	38	2999819	FR	A1	2014-06-20	AIRBUS OPERATIONS SAS		☒
	39	2332840	CA	A1	1999-11-25	SURE POWER CORP		☒
	40	2005056196	JP	A	2005-03-03	FANUC LTD		☒
	41	2014518060	JP	A	2014-07-24	Martin Fornage,		☒
	42	2015528266	JP	A	2015-09-24	Kay 2 IP Holdings, LLC		☒
	43	3717420	JP	B2	2005-11-16	SHARP CORP		☒
	44	5662877	JP	B2	2015-02-04	RENESAS ELECTRONICS CORP		☒
	45	100907946	KR	B1	2009-07-16	PUMPKIN NETWORKS KOREA INC		☒

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/484,728
	Filing Date	2020-01-06
	First Named Inventor	BARBOUR, Stephen
	Art Unit	3688
	Examiner Name	REAGAN, JAMES A
	Attorney Docket Number	91A-3US

	46	20090012523	KR	A	2009-02-04	PUMPKIN NETWORKS KOREA INC		☒
	47	20180084285	KR	A	2018-07-25	HYUNDAI MOTOR CO LTD		☒
	48	2004277	NL	C2	2011-08-23	DATAXENTER IP B V		☐
	49	2793537	CA	A1	2011-04-13	ET INTERNATIONAL		☒
	50	2642422	RU	C2	2018-01-25	TE AES KORPOREJSHN		☒
	51	2015199629	WO	A1	2015-12-30	DOKUZ EYLUEL UENIVERSITESI REKTOERLUEGUE		☒
	52	201214093	TW	A	2012-04-01	HON HAI PREC IND CO LTD		☒
	53	02/07365	WO	A2	2002-01-24	NXEGEN		☐
	54	2006/058341	WO	A2	2006-06-01	SANMINA SCI CORP		☐
	55	2008/039773	WO	A2	2008-04-03	RACKABLE SYSTEMS INC		☐
	56	2011/130406	WO	A1	2011-10-20	INT INC		☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/484,728
	Filing Date	2020-01-06
	First Named Inventor	BARBOUR, Stephen
	Art Unit	3688
	Examiner Name	REAGAN, JAMES A
	Attorney Docket Number	91A-3US

	57	2012/177769	WO	A1	2012-12-27	PLEXXI INC		☐
	58	2013/022501	WO	A1	2013-02-14	STI GROUP		☐
	59	2013/066602	WO	A1	2013-05-10	PLEXXI INC		☐
	60	2013/066604	WO	A1	2013-05-10	PLEXXI INC		☐
	61	2014/130972	WO	A1	2014-08-28	UNIV FLORIDA		☐
	62	2014/185311	WO	A1	2014-11-20	SONY COMPUTER ENTERTAINMENT INC		☒
	63	2015/175693	WO	A1	2015-11-19	GREEN REVOLUTION COOLING INC		☐
	64	2016/106373	WO	A1	2016-06-30	BOSCH GMBH ROBERT		☐
	65	2016/145052	WO	A1	2016-09-15	VAPOR IO INC		☐
	66	2017/074513	WO	A1	2017-05-04	VAPOR IO INC		☐
	67	2017/214210	WO	A1	2017-12-14	XET		☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/484,728
	Filing Date	2020-01-06
	First Named Inventor	BARBOUR, Stephen
	Art Unit	3688
	Examiner Name	REAGAN, JAMES A
	Attorney Docket Number	91A-3US

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		☐

EXAMINER SIGNATURE			
Examiner Signature	/JAMES A REAGAN/ (08/21/2022)	Date Considered	08/21/2022

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	Application Number	16/484,728
	Filing Date	2020-01-06
	First Named Inventor	BARBOUR, Stephen
	Art Unit	3688
	Examiner Name	REAGAN, JAMES A
	Attorney Docket Number	91A-3US

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	/RobertNissen#64256/	Date (YYYY-MM-DD)	2022-07-04
Name/Print	Robert A. Nissen	Registration Number	64256

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.**

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System and Method for Oil and Condensate Processing



US · US20180274347A1 · Joseph A. Riotto · KATA Systems LLC

Priority 2014-05-20 · Filed 2018-05-25 · Published 2018-09-27

A system and method for the on-site separating and treating of a hydrocarbon liquid stream at an oil and gas production site is disclosed. The system comprises an oil and condensate distillation unit and a vapor recovery unit. In one embodiment, the oil and condensate distillation unit operates at ...

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... Although Norris only mentions this art studio's **gas** leak in ... unit for comparison or a common **field** within which to arrange ... with the stronger odours of linseed **oil** and sour, stale French ...

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... Other pioneers in the **field** include Fujitsu FEELthym , a ... to track **bitcoin**, the Internet-based currency, but has **natural** ... the biggest consumer of **oil** and to have a larger **gas** market than the ...

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Published 2009

... Our world has two sets of **natural** laws. One set tells us ... many such incidents occur in any **field**, they are still nowhere ... reference, does not see "**gas** lights and kerosene lamps and electric ...

Michael Watts

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Published 2009

... National **oil** production (crude and **natural gas** liquids) is ... massive Bonga **oil field** --- Nigeria's largest **oil field**, lying within ... of the world **flare** emissions -- after a half century of **oil** and **gas** ...

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Published 2013
... in the production of pyrolysis **oil** and a low-BTU **gas**), gasification (... it for energy generation or **flare** the CH4 help mitigate this ... Anaerobic digestion is a **natural** biological process by which ...

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... find related information, 3) details about **natural** chemicals found in source waters, and 4) a ... it'sa **gas** that turns to liquid when it touches cold air. In liquid form, it defies gravity. It's one of ...

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... that what I did with it was **natural** but forbidden, did not sit well ... My father would pick up his **gas** mask and a black steel ... It was, we later learned, an air mine that, following the **flare**, had ...

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... sudden insurgent signals: a **flare** launch, blinking lights from a ... accompany undercover agents into the **field**, an unusual trait ... 500,000 injectors of a nerve **gas** antidote to the Iraqi army. A ...

Ground Up: A Novel

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Major On-going Cases with Information Concealment Practice

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... of **natural gas** before 2020 7 and net exporter of **oil** and **gas** ... of shale **oil** from depleted conventional fields) to **flare** around ... recoverable from a potential **oil** or **gas field**--estimates made ...

Relationship Between Minerals and Human

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... **mining** from the depths under the land and even seabed. ... **Oil** is indispensible for transportation and **natural gas** is ... Since around 1960, there has been a revolution in the **field** of various ...

Factors influencing the development and reform of the upstream **oil** and **gas** fiscal systems in the UK and Nigeria--a comparative study

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... , is a royalty/tax system operated on a **field** by **field** basis. This requires a high level of expertise on ... However, the story of Nigeria's **natural gas** reserves is rather different (and deserves a ...

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... shale in the laboratory to determine **oil**, **gas**, and spent shale ... -bearing formations that have enough **natural** peruf abili ty. ... of a small central portion of such a **field**, in which ignition and ...

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... we look out and we see the **natural** world and we know what it is ... Although we **field**-check trips every few years, conditions ... alarms); the common highway **flare** used by motorists has also ...

Unwanted guest

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Published 2014
... Armor thins to solar **flare** seething purple burst Thirst, fugitive morsel drifting violet lagoon Barnacle me, my ... mutually hollow trading a sudden **flare** from solar cavities slowly merging ...

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Published 2003
... Lantern is temporarily rendered powerless by the **gas** fumes from canisters being ... **oil** on those deboarding the plane. Senator Jeremiah Clutcher's face is covered with the thick, black **oil**. ...

Economic Evaluation of Magnesite Deposits of Khuzdar, Balochistan, Pakistan

Google Scholar · www.uok.edu.pk · Bashir E · Karachi University Journal of Science
Published 2008
... Minerals are one of the principal **natural** resources essential for ... Recently the **mining** activities are increased but their exact ... and logistic support during **field** work. We sincerely thank the ...

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Published 2003
... **Field**, the biggest American air base outside the United States. Even the exploitation of vast **oil** ... the Mediterranean Sea, and the **mining** of **natural gas** discovered in the Syrian territory ...

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... memories of the time he was once held up at a **gas** station. ... cyanide and arsenic heap-leach **mining**--past the charred and ... at a time, reclearing the **field** each spring and summer while ...

TIMES

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Published 1965
... that the United States will ban imports of Russian **oil**, **natural gas**, and coal, New York Attorney Letitia James warned **oil** companies and **gas** stations that price gouging is illegal and ...

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... within the context of industrial capitalism:the **natural** counterpart to 'mass production'. ... of steam and **gas** engines, steam turbines and every product of electrical engineering.Themain ...

The Appalachian Trail hiker: Trail-proven advice for hikes of any length

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Published 2004

Cosmonaut Keep

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Published 2002

Don du sang à Melle

Google Scholar · blogs.paysmelois.org · Vergnault J
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G., they will be able to play them in the living room at no additional cost. Most of the application can be downloaded free of cost and to make game lovers it's like a cherry on the food. ...

Kingdoms of experience: Everest, the unclimbed ridge

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Published 2003

An X-Ray into the Exo-Prosthetic Superbody

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This chapter elaborates on the exo-prosthetic somatotype, which features the expulsion of the superhero's organs, fluids, skeletal structures, or their objective correlatives into remote ...

John E Kennedy Space Center

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... CEC Model 104 mass spectrometer with **gas** chromatograph interface, and a CEC Model ... the coating under conditions more severe than ordinary **field** conditions. In most instances, flat 4...

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Islam Outside the Arab World

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Published 2001
... exploitation of a significant **natural** resource, **oil**, in the Muslim ... either: it is a **field** for endless anthropological and religious ... , of enormous new **oil** and **gas** reserves within the Caspian. ...

Sex, Surrealism, Dalí and Me: The Memoirs of Carlos Lozano

Google Scholar • books.google.com • Thurlow C
Published 2000
... There was a dash of patchouli **oil** on my temples and a whisper of kohl about my eyes. ... 'Patchouli **oil**,' Dali told her and I was amazed that he should know, as I would always be amazed ...

Patent TW310421B

~~TW~~ • TW310421B • Matsushita Electric Ind Co Ltd
Priority 1993-07-27 • Filed 1995-01-26 • Granted 1997-07-11 • Published 1997-07-11
Printed by the Industrial and Consumer Cooperative of the Central Standardization Bureau of the Ministry of Economic Affairs and applied for a patent Fan 1 -Seed light basket set • It has:-Base 1 Mao _ segment, which can be recorded in the bed logic with the presence of ja and ji pen The star # 中 ...

Children of the Ghetto: Being Pictures of a Peculiar People

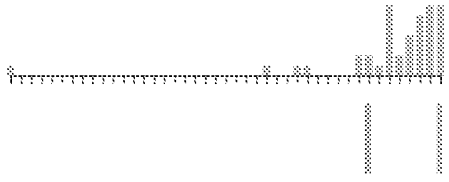
Google Scholar • books.google.com • Zangwill I
Published 1892
... -marked epoch to invest in new everythings from ~~oil~~-cloth to cups and saucers. Especially was ... The single jet of **gas**-light depending from the ceiling flared upon the strange simian faces, ...

Toronto, capital of Ukraine: the ends of desire and the beginning of history in Janice Kulyk Keefer's The Green Library

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Published 2003
... that have been shuffled off the **field**, thus turning our literary ... holes in the ground, like **garbage**? When we have looked on in ... When the horse died of **natural** causes Oleg taunted the ...

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Patents (blockchain mining oil field natural gas flare waste) before:priority:20

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System and Method for Oil and Condensate Processing



US · US20180274347A1 · Joseph A. Riotto · KATA Systems LLC
Priority 2014-05-20 · Filed 2018-05-25 · Published 2018-09-27
A system and method for the on-site separating and treating of a hydrocarbon liquid stream at an oil and gas production site is disclosed. The system comprises an oil and condensate distillation unit and a vapor recovery unit. In one embodiment, the oil and condensate distillation unit operates at ...

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Google Scholar · www.academia.edu · Hsu H · American Literature
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... asserting a unit for comparison or a common **field** within which to arrange specificities, but ... odor of **gas**, of old walls, dusty plaster, and over it all the heavy, sour smell of **garbage**—a ...

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Published 2017
... Other pioneers in the **field** include Fujitsu FEELthym , a ... biggest consumer of **oil** and to have a larger **gas** market than ... vessels turn to LNG (liquefied **natural gas**). Depending on the type ...

General environmental hazards in agriculture communities

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Published 2016

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Published 2009
... Our world has two sets of **natural** laws. One set tells us ... many such incidents occur in any **field**, they are still nowhere ... reference, does not see "**gas** lights and kerosene lamps and electric ...

Michael Watts

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Published 2009
... National **oil** production (crude and **natural gas** liquids) is ... massive Bonga **oil field** -- Nigeria's largest **oil field**, lying within ... of the world **flare** emissions -- after a half century of **oil** and **gas** ...

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Google Scholar - eprints.nwisrl.ars.usda.gov - Leytem A - Sustainable animal agriculture
Published 2013
... in the production of pyrolysis **oil** and a low-BTU **gas**), gasification (... it for energy generation or **flare** the CH4 help mitigate this ... Anaerobic digestion is a **natural** biological process by which ...

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Published 2011
... find related information, 3) details about **natural** chemicals found in source waters, and 4) a ... it'sa **gas** that turns to liquid when it touches cold air. In liquid form, it defies gravity. It's one of ...

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Published 2012
... that what I did with it was **natural** but forbidden, did not sit well ... My father would pick up his **gas** mask and a black steel ... It was, we later learned, an air mine that, following the **flare**, had ...

Daybreak Zero

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Published 2011

Operation Shakespeare: The True Story of an Elite International Sting

Google Scholar - books.google.com - Shiffman J
Published 2014
... sudden insurgent signals: a **flare** launch, blinking lights from a ... accompany undercover agents into the **field**, an unusual trait ... 500,000 injectors of a nerve **gas** antidote to the Iraqi army. A ...

Ground Up: A Novel

Google Scholar - scholar.google.com - Idov M
Published 2009

Defuzzification within a multicriteria decision model

Google Scholar - www.worldscientific.com - Opricovic S - International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems
Published 2003
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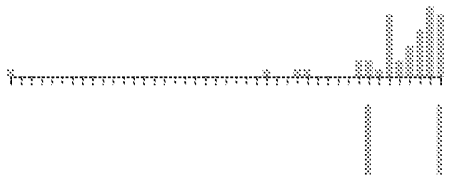
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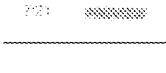
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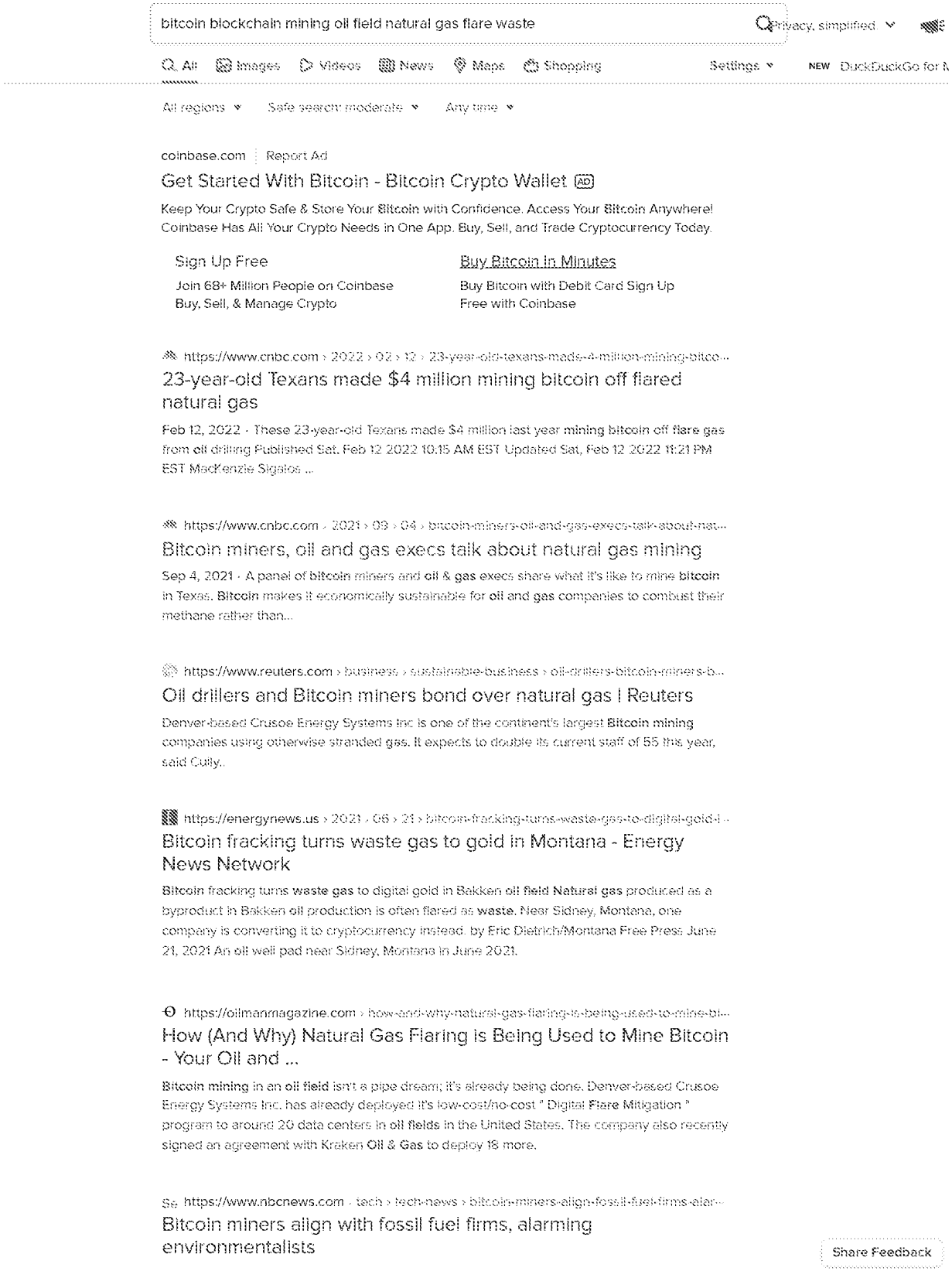
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West Bitcoin fracking turns waste gas to digital gold in Bakken oil field Natural gas produced as a byproduct in Bakken oil production is often flared as waste. Near Sidney, Montana, one company is converting it to cryptocurrency instead. by Eric Dietrich/Montana Free Press June 21, 2021 An oil well pad near Sidney, Montana in June 2021.

https://www.cnbc.com › 2021 › 09 › 04 › bitcoin-miners-oil-and-gas-execs-talk-about-nat...

Bitcoin miners, oil and gas execs talk about natural gas ...

Sep 4, 2021 · Recent production stats show that in the U.S. alone about 1.5 billion cubic feet of natural gas is wasted on a daily basis. And these are just the reported numbers, so the actual figures are likely...

https://ezblockchain.net

EZ Blockchain - Crypto Mining containers, wasted energy ...

of flared gas by up to 70% With Smartgrid system EZ Blockchain developed a plug-and-play solution to turn natural gas flaring into monetization by deploying the EZ Smartgrid Flaring Mitigation System right on the oil well pads to turn wasted natural gas into a new revenue stream, meeting new environmental regulations along the way.

https://www.nbcnews.com › tech › tech-news › bitcoin-miners-align-fossil-fuel-firms-alar...

Bitcoin miners align with fossil fuel firms, alarming ...

The gas Crusoe is using, bought from the oil field's owner, Kraken Oil & Gas, would otherwise be burnt off in flares, emitting CO2 and other pollutants. Selling the gas to crypto miners is a...

Se https://oilmanmagazine.com › how-and-why-natural-gas-flaring-is-being-used-to-mine-bi...

How (And Why) Natural Gas Flaring is Being Used to Mine ...

Bitcoin mining in an oil field isn't a pipe dream; it's already being done. Denver-based Crusoe Energy Systems Inc. has already deployed it's low-cost/no-cost " Digital Flare Mitigation " program to around 20 data centers in oil fields in the United States. The company also recently signed an agreement with Kraken Oil & Gas to deploy 18 more.

Se https://vnexplorer.net › bitcoin-miners-and-oil-and-gas-execs-mingled-at-a-secretive-me...

Bitcoin miners and oil and gas execs mingled at a ...

Share Feedback

Bitcoin miners and oil and gas execs mingled at a secretive meetup in Houston - here's what they talked about 04/09/2021 On a residential back street of Houston, in a 150,000 square-foot warehouse safeguarding high-end vintage cars, 200 oil and gas execs and bitcoin miners mingled, drank beer, and talked shop on a recent Wednesday night in August.

https://www.cummins.com › news › 2019 › 08 › 23 › turning-flare-gas-waste-electricity-a...

Turning flare gas waste into electricity and heat ...

Turning flare gas waste into electricity and heat. As the global concern for gas flaring grows, oil companies will be investing in technologies that utilize the unburned fuel without harming the environment or pocketbook. While generally considered a waste byproduct, flare gas - the excess natural gas that is removed from refineries by ...

https://www.globalpwr.com › industrial-power-solutions › field-gas-flaring

Generators for Field Gas & Flaring in the Oil and Gas Industry

Instead of burning-off this natural gas, having it essentially going to waste and contributing emissions that harm the environment, it is being used to power the generators that in turn power their oil well pump jacks, man-camps, and other buildings. When compared to diesel fuel, the cost savings are enormous.

More Results

Better for the Planet

We're carbon negative! Read our climate pledge.

How We Are Profitable

The world needs an alternative to the collect-it-all business model.

Help Spread DuckDuckGo

Help your friends and family join the Duck Side!

Stay Informed

We don't track you, bu

Learn how to protect y

Share Feedback

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1 - 50

Blockchain mine at oil or gas facility

Methods and systems of operating a blockchain mining device using natural gas produced at a hydrocarbon production, storage, or processing site/facility. A generator may be retrofitted to an existing prime mover used to pump the well, and the generator may be used to power the blockchain mining...

UPSTREAM DATA INC

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Blockchain mine at oil or gas facility

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UPSTREAM DATA INC

US20200051184 | US Applications | 2020-02-13 | 4

Blockchain mine at oil or gas facility

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Systems and methods for generating and consuming power from natural gas

Systems and methods are provided to mitigate flaring of natural gas. A natural gas processing system may process raw natural gas into a fuel gas stream that may be used to power any number of on-site power generation modules. In turn, the power generation modules may convert the fuel gas stream into...

CRUSOE ENERGY SYS INC

US10862309 | US Patents | 2020-12-08 | 4

Systems and methods for generating and consuming power from natural gas

Systems and methods are provided to mitigate flaring of natural gas. A natural gas processing system may process raw natural gas into a fuel gas stream that may be used to power any number of on-site power generation modules. In turn, the power generation modules may convert the fuel gas stream into

CRUSOE ENERGY SYS INC

US10862307 | US Patents | 2020-12-08 | 4

Systems and methods for integrated management of associated gas and produced water at oil well

Result 1

Relevance

Collections

IEEE Conferences: 28
Periodicals at ...
Conferences a...
Korea Applications: ...
Australia Appli...
Canada Patents: 40
Canada Applic...
Russia Patents: 68

Publication Date

1915

Charts based on top 1500 results

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Discover Map blockchain mining oil field natural gas flare waste TIC

1 - 50

Relevance

Blockchain mine at oil or gas facility

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CA3080844A1 | Canada Applications | 2018-08-16 | 4

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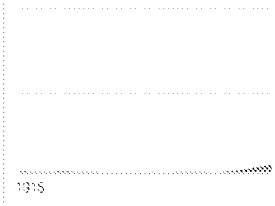
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Natural gas power generation and consumption system and method

Collections



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Charts based on top 1500 results

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Result 1

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	11	((("BARBOUR") near3 ("Stephen"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/04/15 10:20 AM
L2	0	((("UPSTREAM") near3 ("DATA") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2022/04/15 10:21 AM
L3	44658	(G06Q50/06 OR E21B41/00 OR F02M21/0209 OR F02M21/0218 OR G05B15/02 OR G06F16/2315 OR G06Q10/06313 OR H04L67/104 OR H04L67/1097 OR G06Q2220/00 OR H02J9/06 OR G06Q10/06).cpc.	(USPAT)	OR	ON	ON	2022/04/15 10:21 AM
L5	4	1 AND (blockchain OR block$chain OR "block chain")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/15 10:22 AM
L6	5672	3 AND (blockchain OR block$chain OR "block chain")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/15 10:22 AM
L7	159	3 AND (blockchain OR block$chain OR "block chain") AND oil AND "natural gas"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/15 10:22 AM
L8	130	3 AND (blockchain OR block$chain OR "block chain") AND oil AND "natural gas" AND min$3	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/15 10:23 AM
L9	15	("7525207" | "7742830" | "8683823" | "8832476" | "8849469" | "9100089" | "9310855" | "9342375" | "9383791" | "20130160059" | "20140096837" | "20150321739").pn. OR ("10822992").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/15 12:57 PM
L10	2	"20080135238"	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/04/16 07:47 AM
L11	2	"20080135238"	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	ON	ON	2022/04/16 07:47 AM

L12	3	"20160261685"	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	ON	ON	2022/04/16 07:47 AM
L13	46	("20030196798" OR "20040239499" OR "20050179263" OR "20080135238" OR "20090107671" OR "20100038907" OR "20110199862" OR "20130002443" OR "20130065669" OR "20130112419" OR "20130166455" OR "20130245947" OR "20140237611" OR "20140237614" OR "20140316984" OR "20150261269" OR "20150262139" OR "20150292303" OR "20150294308" OR "20150310424" OR "20150310476" OR "20150356524" OR "20150358943" OR "20150369013" OR "20160010445" OR "20160052814" OR "20160109122" OR "20160112200" OR "20160125040" OR "20160164672" OR "20160214715" OR "20160218879" OR "20160261404" OR "20160261685" OR "20160283920" OR "20160300234" OR "20160319653" OR "20160328713" OR "20160330031" OR "20160330035" OR "20160342977" OR "20160362954" OR "7542947" OR "8156206" OR "8483715" OR "9495668").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/16 07:55 AM
L14	6	("20120077427" OR "20120300291" OR "20120300391" OR "20160128238" OR "20170280594" OR "20200040272").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/16 07:56 AM
L15	46	("20030196798" OR "20040239499" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/16 07:56 AM

		"20050179263" OR "20080135238" OR "20090107671" OR "20100038907" OR "20110199862" OR "20130002443" OR "20130065669" OR "20130112419" OR "20130166455" OR "20130245947" OR "20140237611" OR "20140237614" OR "20140316984" OR "20150261269" OR "20150262139" OR "20150292303" OR "20150294308" OR "20150310424" OR "20150310476" OR "20150356524" OR "20150358943" OR "20150369013" OR "20160010445" OR "20160052814" OR "20160109122" OR "20160112200" OR "20160125040" OR "20160164672" OR "20160214715" OR "20160218879" OR "20160261404" OR "20160261685" OR "20160283920" OR "20160300234" OR "20160319653" OR "20160328713" OR "20160330031" OR "20160330035" OR "20160342977" OR "20160362954" OR "7542947" OR "8156206" OR "8483715" OR "9495668").pn.					
L16	8	((US-20190063252-A1 OR US-20190042990-A1 OR US-20140096837-A1 OR US-20080135238-A1 OR US-20160261685-A1).did. AND PGPB.dbnm.) OR ((US-8849469-B2).did. AND USPT.dbnm.) OR ((US-20080135238-A1 OR US-20160261685-A1).did. AND DWPI.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/16 09:06 AM

L17	6	16 AND block$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/16 09:06 AM
L18	1	16 AND block$chain	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/16 09:06 AM
L19	132	13 OR 14 OR 15	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/16 09:07 AM
L20	1	19 AND (blockchain OR block$chain OR "block chain") AND oil AND "natural gas" AND min$3	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:07 AM
L21	17	19 AND (blockchain OR block$chain OR "block chain") AND min$3	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:08 AM
L22	1	19 AND (blockchain OR block$chain OR "block chain") AND (oil OR "natural gas")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:11 AM
L23	4	("2020/0040272").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/16 09:11 AM
L24	128	("5142672" | "5367669" | "5913046" | "6288456" | "6633823" | "7143300" | "7376851" | "7647516" | "7702931" | "7779276" | "7861102" | "7921315" | "7970561" | "8001403" | "8006108" | "8214843" | "8260913" | "8374928" | "8447993" | "8571820" | "8627123" | "8639392" | "8700929" | "8706915" | "8719223" | "8789061" | "8799690" | "9003211" | "9003216" | "9026814" | "9027024" | "9143392" | "9207993" | "9218035"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/16 09:11 AM

		| "9282022" | "9542231" | "9552234" | "9645596" | "9994118" | "10367353" | "10367535" | "10444818" | "10452127" | "10452532" | "10497072" | "10608433" | "10618427" | "10637353" | "20020072868" | "20020158749" | "20030023885" | "20030037150" | "20030074464" | "20040117330" | "20050203761" | "20060161765" | "20080030078" | "20080094797" | "20090055665" | "20090070611" | "20090078401" | "20090089595" | "20090216910" | "20100211810" | "20100235004" | "20100280675" | "20100328849" | "20110072289" | "20110238342" | "20110239010" | "20120000121" | "20120072745" | "20120300524" | "20120306271" | "20120324259" | "20130006401" | "20130063991" | "20130086404" | "20130117621" | "20130187464" | "20130227139" | "20130304903" | "20130306276" | "20140070756" | "20140137468" | "20140180886" | "20140379156" | "20150012113" | "20150121113" | "20150155712" | "20150212122" | "20150229227" | "20150277410" | "20150278968" |					

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L25	9	24 AND (blockchain OR block$chain OR "block chain") AND (oil OR "natural gas")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:12 AM
L26	65	("6288456" | "6633823" | "7143300" | "7647516" | "7702931" | "7779276" | "7861102" | "7921315" | "7970561" | "8001403" | "8006108" | "8214843" | "8374928" | "8447993" | "8571820" | "8627123" | "8789061" | "8799690" | "9003211" | "9003216" | "9026814" | "9207993" | "9218035" | "9552234" | "20080030078" | "20080094797" | "20090055665" | "20100211810" |	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/16 09:12 AM

		"20100328849" | "20110238342" | "20120000121" | "20120072745" | "20120300524" | "20130006401" | "20130063991" | "20130086404" | "20130187464" | "20130306276" | "20140137468" | "20140379156" | "20150155712" | "20150229227" | "20160198656" | "20160212954" | "20160324077" | "20170104336" | "20180144414").pn. OR ("10367353").urpn. AND (PGPB | USPT | USOC).dbnm.					
L27	18	26 AND (blockchain OR block$chain OR "block chain") AND (oil OR "natural gas")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:12 AM
L28	2615	(blockchain OR block$chain OR "block chain") AND (oil OR "natural gas")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:13 AM
L29	156	28 AND (blockchain OR block$chain OR "block chain") AND ((oil OR "natural gas") SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:13 AM
L30	0	28 AND (blockchain OR block$chain OR "block chain") AND ((oil OR "natural gas") SAME generator SAME server SAME mining)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:14 AM
L31	5	28 AND ((blockchain OR block$chain OR "block chain") SAME server SAME mining) AND ((oil OR "natural gas") SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:14 AM
L32	36	28 AND ((blockchain OR block$chain OR "block chain") SAME server SAME mining) AND ((oil OR "natural gas"))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:15 AM
L33	22	28 AND ((blockchain OR block$chain OR "block chain") SAME	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:16 AM

		server SAME mining) AND (generator)					
L34	121	((blockchain OR block$chain OR "block chain") SAME server SAME mining) AND (generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:16 AM
L35	1024	((blockchain OR block$chain OR "block chain") SAME mining) AND (generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:19 AM
L36	42	((blockchain OR block$chain OR "block chain") SAME mining) AND (generator WITH gas)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:19 AM
L37	439	((blockchain OR block$chain OR "block chain" OR "distributed ledger") SAME mining SAME server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:22 AM
L38	6	37 AND (server SAME electric$4 SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:22 AM
L39	8	37 AND (server SAME (electric$4 OR power) SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:24 AM
L40	176	37 AND (server SAME (electric$4 OR power))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:25 AM
L41	717	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME mining SAME server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:26 AM
L42	9	41 AND (server SAME electric$4 SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:27 AM
L43	3	"9982516"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:27 AM
L44	2	"20150337218"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:28 AM
L45	107	41 AND (vented OR flared OR wast$4) AND (natural OR methane OR gas)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:34 AM
L46	9	41 AND (server SAME electric$4 SAME power SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:37 AM
L47	4507	((blockchain OR	(US-PGPUB; USPAT;	OR	ON	ON	2022/04/16

		block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME mining)	EPO; JPO)				09:38 AM
L48	17	47 AND (server SAME electric$4 SAME power SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:38 AM
L49	4765	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 10:05 AM
L50	17	49 AND (server SAME electric$4 SAME power SAME (generator OR genereation))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 10:06 AM
L51	39	49 AND ((computer OR server) SAME electric$4 SAME power SAME (generator OR genereation))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 10:06 AM
L52	156	49 AND ((computer OR server) SAME (electric$4 OR power) SAME (generator OR genereation))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 10:06 AM
L53	738	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining) SAME server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:24 AM
L54	10	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining) SAME server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:24 AM

L55	339	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining)) AND (server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:25 AM
L56	952	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:27 AM
L57	98	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) SAME (server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:27 AM
L58	85	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME (power WITH generator))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:28 AM
L59	39	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:30 AM

		cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME (electric$4 WITH generator))					
L60	33	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME ((portable OR mobile) WITH generator))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:31 AM
L61	4045	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) WITH (server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:31 AM
L62	1936	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) WITH (mine OR mining OR verify OR verification OR verifying)) WITH (server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:32 AM
L63	58	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) WITH (mine OR mining) SAME (verify OR verification OR verifying)) WITH (server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:32 AM

L64	97	"7525207"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:34 PM
L65	2	"20140096837"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:34 PM
L66	3	"8683823"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:34 PM
L67	4	"9100089"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:35 PM
L68	1	"20150321739"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:35 PM
L69	156	49 AND ((computer OR server) SAME (electric$4 OR power) SAME (generator OR generetion))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:39 PM
L70	102	69 AND ("natural gas", OR methane OR flare OR burn$3 OR waste biogas)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:42 PM
L71	1	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) WITH (mine OR mining) SAME (verify OR verification OR verifying)) WITH (server)	(EPO; JPO)	OR	ON	ON	2022/04/16 02:42 PM
L72	1	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining) (verify OR verification OR verifying)) (server)	(EPO; JPO)	SAME	ON	ON	2022/04/16 02:43 PM
L73	13	(blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining)	(EPO; JPO)	SAME	ON	ON	2022/04/16 02:43 PM
L74	14	(blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR	(EPO; JPO)	AND	ON	ON	2022/04/16 02:44 PM

		cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining)					
L75	892	(blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining)	(FPRS; EPO; JPO)	AND	ON	ON	2022/04/16 02:44 PM
L76	23	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining) (verify OR verification OR verifying)) (server)	(FPRS; EPO; JPO)	SAME	ON	ON	2022/04/16 02:44 PM

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16484728
Filing Date	2018-02-06
First Named Inventor	Stephen Barbour
Art Unit	
Examiner Name	
Attorney Docket Number	91A-3US

U.S.PATENTS

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
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U.S.PATENT APPLICATION PUBLICATIONS

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	20160330031		2016-11-10	Drego et al.	

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FOREIGN PATENT DOCUMENTS

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	2016067295	WO		2016-05-06	Spondoolies Tech LTD.		☐

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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]

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16484728
	Filing Date	2018-02-06
	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

	1	THESELFGOVERNED, Electricity Consumption: Bitcoin mining vs The current global financial system, Reddit, posted June 5, 2014, 15 pages.	☐
	2	MIA BENNETT, Blog - Bitcoin mining: The next rush to hit the Arctic?, posted February 6, 2018, 14 pages.	☐
	3	PYMNTS, China Moves To Squeeze Out Bitcoin Mining, posted January 10, 2018, 7 pages.	☐
	4	Cryptocurrency investors eye provinces with low electricity rates, The Fraser Institute Blog, posted January 31, 2018, 3 pages.	☐
	5	JCHI2210, Free natural gas, is it worth it to use a Natural gas generator?, Bitcoin Forum, posted August 27, 2017, 7 pages.	☐
	6	AMANDA STEPHENSON, Genalta Power earns carbon offsets for turning flare gas into electricity, Calgary Herald, posted September 30, 2014, 6 pages.	☐
	7	KENYN, Saving the environment through bitcoin; one transaction equals 117 recycled bottles, Reddit, posted February 26, 2017, 17 pages.	☐
	8	KINOLVA, Shower Thought: Mining Bitcoin for Heat / Hot Water?, Reddit, posted January 28, 2017, 14 pages.	☐
	9	The Best Places in The World to Mine Bitcoin, PRNewswire, posted January 18, 2018, 8 pages.	☐

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Examiner Signature	/JAMES A REAGAN/ (08/21/2022)	Date Considered	08/21/2022

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	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

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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	/RobertNissen#64256/	Date (YYYY-MM-DD)	2022-05-31
Name/Print	Robert A. Nissen	Registration Number	64256

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.**

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

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.

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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.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors: STEPHEN BARBOUR | Attorney Docket No.: 91A-3US

Application No.: 16/484,728 | Art Unit: 3688 / Confirmation No.: 1944

Filed: August 08, 2019 | Examiner: Reagan, James A

Title: BLOCKCHAIN MINE AT OIL OR GAS FACILITY

AMENDMENT AFTER NON-FINAL REJECTION

July 4, 2022

TO THE COMMISSIONER FOR PATENTS:

INTRODUCTORY COMMENTS

In response to the official action of April 19, 2022, the Applicant requests that the patent office please amend the above identified application as follows:

Amendments to the Claims are reflected in the listing of the claims, which begins on page 2 of this paper.

Remarks/Arguments begin on page 10 of this paper.

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A system comprising:

a source of combustible gas produced from [[an oil]] a facility selected from a group consisting of a hydrocarbon production, storage, or processing facility;

a generator connected to the source of combustible gas to receive a continuous flow of combustible gas to power the generator; and

[[a]] blockchain mining devices connected to the generator;

in which:

the blockchain mining devices each have a mining processor and are connected to a network interface;

the network interface is connected to receive and transmit data through the internet to a network that stores or has access to a blockchain database;

the mining processors are connected to the network interface and adapted to mine transactions associated with the blockchain database and to communicate with the blockchain database;

the network is a peer-to-peer network;

the blockchain database is a distributed database stored on plural nodes in the peer-to-peer network; and

the blockchain database stores transactional information for a digital currency.

2. (Original) The system of claim 1 isolated from a sales gas line and an external electrical power grid.

3. (Currently amended) The system of claim 1 in which:

the [[oil]]source of combustible gas and the ~~production, storage, or processing~~ facility comprise[[s]] a remote well selected from a group consisting of a remote oil or gas well;

~~the source of combustible gas comprises the remote oil well;~~ and

the remote [[oil]] well is connected to produce [[a]]the continuous flow of combustible gas to power the generator.

4. (Original) The system of claim 3 further comprising a combustion engine connected to the source of combustible gas and connected to drive the generator.

5. (Currently amended) The system of claim 4 in which the combustion engine is a prime mover that is connected to produce oil from the remote [[oil]] well.

6. (Currently amended) The system of claim 4 in which the combustion engine is a first combustion engine, and further comprising a second combustion engine that is a prime mover that is connected to produce oil from the remote [[oil]] well.

7. (Currently amended) The system of claim 1 in which:

the ~~oil production, storage, or processing~~ facility comprises a unit selected from a group consisting of an oil storage or processing unit;

the source of combustible gas comprises the ~~oil storage or processing~~ unit, which has a gas outlet connected to supply combustible gas to operate the generator; and

the ~~oil storage or processing~~ unit is connected to receive oil produced from a remote oil well.

8. (Currently amended) The system of claim 1 in which the generator and blockchain mining devices are located adjacent to the ~~oil production, storage, or processing~~ facility.

9. (Currently amended) The system of claim 1 in which the ~~oil production, storage, or processing~~ facility comprises ~~a remote oil well, which comprises~~ a plurality of remote wells selected from a group consisting of remote oil or gas wells, and one or both of the following conditions are satisfied:

the plurality of remote [[oil]] wells are located on a multi-well pad; or

the plurality of remote [[oil]] wells include a satellite well.

10-11. (Cancelled)

12. (Currently amended) The system of claim [[10]]1 in which ~~a controller~~ the system is ~~connected~~ configured to modulate a power load level exerted by the blockchain mining devices on the generator, by increasing or decreasing the mining activity of the mining processor.

13. (Currently amended) The system of claim 12 in which[[:]]

~~the mining processor comprises a plurality of mining processors; and~~

the ~~controller~~ system is ~~connected~~ configured to modulate the maximum power load level by selecting one or more actions from a group of actions consisting of increasing or decreasing a maximum number of mining processors that are engaged in mining transactions.

14. (Cancelled)

15. (Currently amended) The system of claim [[14]]13 in which the ~~controller~~ system is ~~connected~~ configured to modulate the power load level in response to variations in a production rate of combustible gas from the remote [[oil]] well.

16. (Currently amended) The system of claim [[14]]13 in which:

a production rate of combustible gas from the remote [[oil]] well varies between a daily minimum production rate and a daily maximum production rate; and

while the production rate is above the daily minimum production rate, the controller is set to limit the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate.

17. (Original) The system of claim 16 in which the controller is set to divert to a load bank excess electricity produced by the generator.

18. (Currently amended) The system of claim [[14]]13 in which:

a production rate of combustible gas from the remote [[oil]] well varies between a daily minimum production rate and a daily maximum production rate;

the controller is set to limit the power load level to above a power level producible by the generator when the production rate is at the daily minimum production rate; and

a backup source, selected from a group consisting of fuel or electricity, is connected make up a shortfall in fuel or electricity, respectively, required to supply the blockchain mining devices with the power load level.

19. (Currently amended) The system of claim 1 in which a controller is connected to operate a cooling system to maintain the blockchain mining devices within a predetermined operating range of temperature.

20. (Currently amended) The system of claim 1 in which the blockchain mining devices are housed in a portable enclosure that is structured to one or more of form ~~mounted on~~ a skid or be mounted on a trailer.

21. (Currently amended) The system of claim 20 in which the ~~skid or trailer~~ portable enclosure comprises a generator driven by an engine, which is connected to the source of combustible gas.

22. (Original) The system of any claim 21 in which the engine comprises a turbine.

23. (Currently amended) The system of claim [[1]] 20 in which the ~~blockchain mining device~~ portable enclosure comprises an intermodal transport container.

24. (Currently amended) A method comprising:

producing electricity using a generator and a source of combustible gas produced at a facility selected from the group consisting of a hydrocarbon production well, storage, or processing facility, ~~to produce electricity to~~ and operating[[e a]] blockchain mining devices located at the ~~hydrocarbon production well, storage, or processing~~ facility, respectively, using the electricity, in which:

the generator is connected to the source of combustible gas, in which the facility is connected to produce a continuous flow of combustible gas to power the generator;

the blockchain mining devices each have a mining processor and are connected to a network interface;

the network interface is connected to receive and transmit data through the internet to a network that stores or has access to a blockchain database;

the mining processors are connected to the network interface and adapted to mine transactions associated with the blockchain database and to communicate with the blockchain database;

the network is a peer-to-peer network;

the blockchain database is a distributed database stored on plural nodes in the peer-to-peer network; and

the blockchain database stores transactional information for a digital currency.

25. (Currently amended) The method of claim 24 further comprising, prior to using the source of combustible gas:

one or both disconnecting or diverting the source of combustible gas from a combustible gas disposal device at the ~~hydrocarbon production well, storage, or processing~~ facility; and

connecting the source of combustible gas to operate the blockchain mining devices.

26. (Currently amended) The method of claim 24 further comprising:

connecting the source of combustible gas to operate the blockchain mining devices; and

diverting gas from a combustible gas disposal ~~or storage~~ device to operate the blockchain mining devices.

27. (Currently amended) The method of claim 25 in which the combustible gas disposal ~~or storage~~ device comprises one or more of a flare, a vent to the atmosphere, an incinerator, or a burner.

28. (Currently amended) The method of claim 24 in which the ~~hydrocarbon production well, storage, or processing~~ facility is selected from a group consisting of ~~comprises~~ an oil or gas well that is isolated from a sales gas line and an external electrical power grid.

29. (Currently amended) The method of claim 24 in which the source of combustible gas is a remote well selected from a group consisting of a remote oil or gas well~~, and further comprising producing a continuous flow of combustible gas to power a generator connected to operate the blockchain mining device~~.

30. (Original) The method of claim 29 in which producing further comprises supplying combustible gas to a combustion engine that is connected to drive the generator.

31. (Currently amended) The method of claim 30 ~~in which the source of combustible gas is a remote oil well, and~~ further comprising using the combustion engine as a prime mover to produce oil from the remote [[oil]] well.

32. (Original) The method of claim 31 in which, prior to using the source of combustible gas, the combustion engine is under loaded as the prime mover, and further comprising connecting the generator to a power takeoff connected to the combustion engine.

33. (Currently amended) The method of claim 30 in which the combustion engine is a first combustion engine, the remote well is a remote oil well, and further comprising:

prior to supplying combustible gas to the first combustion engine, connecting the first combustion engine to receive combustible gas from the remote oil well; and

using a second combustion engine as a prime mover to produce oil from the remote oil well.

34. (Currently amended) The method of claim 29 further comprising operating the blockchain mining devices to:

mine transactions with the blockchain mining devices; and

communicate wirelessly through the internet to communicate with a blockchain database.

35. (Currently amended) The method of claim 34 further comprising modulating~~, using a controller,~~ a power load level exerted by the blockchain mining device<u>s</u> on the generator, by <u>selecting an action from a group of actions consisting of</u> increasing or decreasing<u>,</u> a mining activity of the blockchain mining device<u>s</u>.

36. (Currently amended) The method of claim 35 in which:

~~the blockchain mining device comprises a plurality of mining processors; and~~

modulating comprises modulating the power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining transactions.

37. (Currently amended) The method of claim 36 in which modulating comprises modulating the power load level in response to variations in a production rate of combustible gas from the remote ~~oil or gas~~ well.

38. (Currently amended) The method of claim [[36]]<u>35</u> in which:

a production rate of combustible gas from the remote ~~oil or gas~~ well varies between a daily minimum production rate and a daily maximum production rate; and

modulating comprises limiting, while the production rate is above the daily minimum production rate, the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate.

39. (Original) The method of claim 38 further comprising diverting to a load bank excess electricity produced by the generator.

40. (Currently amended) The method of claim [[36]]<u>35</u> in which:

a production rate of combustible gas from the remote ~~oil or gas~~ well varies between a daily minimum production rate and a daily maximum production rate;

modulating comprises limiting the power load level to above a power level produced by the generator when the production rate is at the daily minimum production rate; and

supplying from a backup source, which is selected from a group consisting of a backup fuel or electricity source, a shortfall in fuel or electricity, respectively, required to supply the blockchain mining devices with the power load level.

41. (Original) The method of claim 40 in which the power load level is limited to above a power level produced by the generator when the production rate is at the daily maximum production rate.

42. (New) The system of claim 20 in which the portable enclosure has the form of a box with walls, a top, and a base, with one or more access doors formed in the walls.

43. (New) The system of claim 1 further comprising a combustible gas disposal device, at the facility, the combustible gas disposal device being connected to receive combustible gas from the source of combustible gas.

44. (New) The system of claim 43 further comprising a valve connected upstream of the generator to receive the continuous flow of gas from the source of combustible gas, and selectively supply the continuous flow of gas to the generator, the combustible gas disposal device, or both the generator and the combustible gas disposal device, to selectively divert the continuous flow of gas to the combustible gas disposal device, the generator, or both the generator and the combustible gas disposal device, respectively.

REMARKS

This amendment is responsive to the Office Action mailed April 19, 2022. The Applicant has carefully considered the cited art and the comments provided in the Office Action. Applicants respectfully request reconsideration of the application in view of the foregoing amendments and the following remarks.

Examiner Interview

Applicant appreciates Examiner Reagan's very helpful participation in an Examiner Interview on June 15, 2022. During the interview, the cited prior art was discussed, as well as proposed amendments that would further distinguish the claims from the cited art.

Supplemental Information Disclosure Statement

Applicant submits herewith a supplemental information disclosure form, and requests the examiner consider each reference listed within.

Amendments to the Claims

The independent system claim (Claim 1) and independent method Claim 24 are amended to:

- clarify using Markush form that the facility is selected from a group consisting of a hydrocarbon production, storage, or processing facility;
- clarify that a generator is connected to the source of combustible gas to receive a continuous flow of combustible gas to power the generator, as supported by the application as filed, for example original Claims 1, 3, 14, and 29;
- clarify that there are plural blockchain mining devices, as supported by the application as filed, for example original Claim 13; and
- clarify that the blockchain mining devices each have a mining processor and are connected to a network interface, the network interface is connected to receive and transmit data through the internet to a network that stores or has access to a blockchain database, the mining processors are connected to the network interface and adapted to mine transactions associated with the blockchain database and to communicate with the

blockchain database, the network is a peer-to-peer network, the blockchain database is a distributed database stored on plural nodes in the peer-to-peer network, and the blockchain database stores transactional information for a digital currency, as supported by the application as filed, for example original Claims 10-11, 33, and Fig. 4.

In addition, Claim 24 is further amended to clarify the "using" step as involving producing electricity and operating using the electricity, as supported by the application as filed.

Various of the dependent claims are amended for clarity, for consistency with the amendments to Claims 1 and 24, and/or to refer optional components (such as an oil or gas well) in Markush form as supported by the application as filed.

Previous Claims 10-11 are cancelled according to the amendment to Claim 1.

Claims 12, 13, 15, and 35 are amended to relax the controller requirement, and clarify the modulating step / configuration step, as supported by the application as filed, for example paragraphs 14, 71, and 72, original Claims 35-40, and the original abstract.

Previous Claim 14 is cancelled.

Claim 20 is amended to clarify that the blockchain mining devices are housed in a portable enclosure, which is structured to one or more of form a skid or be mounted on a trailer, as supported by the application as filed, for example original Claim 20.

Claim 23 is amended to clarify that the portable enclosure comprises an intermodal transport container, as supported by the application as filed, for example paragraph 65 and original Claim 23.

Claim 25 is clarified to recite one or both disconnecting or diverting, as supported by the application as filed, for example paragraphs 14, 47, and 48, and Fig. 3.

Claims 26 and 27 are amended to remove reference to a storage device.

New Claim 42 is added to clarify that the portable enclosure has the form of a box with walls, a top, and a base, with one or more access doors formed in the walls, as supported by the application as filed, for example paragraphs 13, 20, 45, and 65, and Fig. 4.

New Claim 43 is added to clarify that there is a combustible gas disposal device, at the facility, the combustible gas disposal device being connected to receive combustible gas from the source of combustible gas, as supported by the application as filed, for example paragraphs 14, 47-48, and 75, Fig. 3, and original Claim 25.

New Claim 44 is added to clarify that there is a valve upstream of the generator to receive the continuous flow of gas from the source of combustible gas, and selectively supply the continuous flow of gas to the generator or the combustible gas disposal device, as supported by the application as filed, for example paragraphs 14, 47-48, and 75, Figs. 1 and 3, and original Claim 25.

Various other minor claim amendments are made for clarity and consistency.

Claim Rejections Under 35 U.S.C. § 112

The examiner indicated that:

Claim 24 is rejected under 35 U.S.C. 112(b) or pre-AIA 35 U.S.C. 112, 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. The claim appears to be written as a "use claim." See MPEP 2173.05(q).

The Applicant respectfully traverses this rejection. Claim 24 has been amended to clarify the use step as a generating electricity and operating blockchain mining devices step. Claim 24 is definite.

The examiner also indicated that:

Claims 1, 3, 7, 9, 13, 14, 18, 20, 21, 24-29, 35, and 40 are rejected under 35 U.S.C. 112(b) or pre-AIA 35 U.S.C. 112, 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. The Examiner cannot determine the metes and bounds of the claim because the claim has been written in the alternative using an "or" statement. For the purposes of this examination, the Examiner will assume that the claim is a properly written Markush-type limitation: ...one of the group consisting of [A, B, *and* C].

The Applicant respectfully traverses this rejection. The claims recited above have been amended to Markush form, cancelled, or otherwise clarified, and are definite.

Patentability of Claims over Belady in view of Gleifchauf

The examiner indicated that:

Claims 1-3, 8, 10-18, 24-26, 28, 29, 34-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belady et al. (USPGP 2014/0096837 A1), hereinafter **BELADY**, in view of Gleichauf (USPGP 2018/0109541 A1), hereinafter **GLEIFCHAUF**.

The applicant respectfully traverses this rejection.

Claim 1 as amended recites:

1. A system comprising:
a source of combustible gas produced from a facility selected from a group consisting of a hydrocarbon production, storage, or processing facility;
a generator connected to the source of combustible gas to receive a continuous flow of combustible gas to power the generator; and
blockchain mining devices connected to the generator;
in which:
the blockchain mining devices each have a mining processor and are connected to a network interface;
the network interface is connected to receive and transmit data through the internet to a network that stores or has access to a blockchain database;
the mining processors are connected to the network interface and adapted to mine transactions associated with the blockchain database and to communicate with the blockchain database;
the network is a peer-to-peer network;
the blockchain database is a distributed database stored on plural nodes in the peer-to-peer network; and
the blockchain database stores transactional information for a digital currency.

Similarly, Claim 24 as amended recites:

24. A method comprising:
producing electricity using a generator and a source of combustible gas produced at a facility selected from the group consisting of a hydrocarbon production well, storage, or processing facility, and operating

blockchain mining devices located at the facility, respectively, using the electricity, in which:

the generator is connected to the source of combustible gas, in which the facility is connected to produce a continuous flow of combustible gas to power the generator;

the blockchain mining devices each have a mining processor and are connected to a network interface;

the network interface is connected to receive and transmit data through the internet to a network that stores or has access to a blockchain database;

the mining processors are connected to the network interface and adapted to mine transactions associated with the blockchain database and to communicate with the blockchain database;

the network is a peer-to-peer network;

the blockchain database is a distributed database stored on plural nodes in the peer-to-peer network; and

the blockchain database stores transactional information for a digital currency.

Neither Belady or Gleifchauf disclose or teach the above-recited claimed system or method.

Belady appears to disclose a generic gas-powered data center, which is able to accommodate inconsistent gas supply using a shock absorbing method.

Gleifchauf appears to disclose a method of blockchain mining using trusted nodes.

With respect, neither Belady nor Gleifchauf teach or suggest the applicant's claimed system or method. Despite the pre-existence of Belady's gas-powered data center, in many cases before Applicant, combustible gas at a hydrocarbon production, storage, or processing facility was commonly vented, flared, or otherwise wasted (paragraphs 32-34 of Applicant's specification as filed). Often the infrastructure for selling electricity or combustible gas is lacking at a hydrocarbon production, storage, or processing facility (paragraphs 35-36), or the gas is too low quality to use for conventional uses (paragraph 30) - hence why such gas is routinely wasted. The Applicant, however, has discovered that such gas may be used to power blockchain mining devices successfully. Blockchain mining is not synonymous with regular data center processing and cannot be compared as such. By contrast, blockchain mining is known to be energy-intensive (Applicant's paragraph 55 and Gleifchauf paragraphs 4 and 60) - more so than traditional data-processing. The Applicant submits that, prior to Applicant's creation of its claimed system and

method, it was not inherent that such mining activity could be successfully coupled with combustible gas produced at hydrocarbon production, storage, or processing facilities to provide useful and revenue-generating output. However, Applicant has, in making its discovery, provided a mechanism for leveraging the energy in such gas as to provide a source of income, in situations where such gas otherwise might be wasted, for example vented or flared. Applicant's discovery amounts to a new use for previously known individual components (a common precursor for patentability), and may provide numerous benefits including the reduction of greenhouse gas emissions and capture of revenue where gas disposal is otherwise a capital loss (for example paragraphs 33, 34, 48, and 73).

By contrast, neither Belady nor Gleifchauf, whether alone or in combination, teach or suggest applicant's claimed system and method, or the associated advantages. Belady teaches a gas-powered data center, while Gleifchauf teaches a system that carries out difficult and energy-intensive calculations (see para. 4, also Gleifchauf references difficulty, including increasing difficulty over time, numerous times throughout). It would not be obvious at the relevant time for a skilled worker to combine such teachings to yield Applicant's Claim 1 or 24.

Thus, Applicant's Claims 1 and 24, and all claims dependent on such claims, are novel and unobvious over Belady and Gleifchauf in any combination.

CONCLUSION

All pending claims are in condition for allowance. Therefore applicant respectfully requests reconsideration and withdrawal of the objections and rejections, and allowance of the claims, at an early date. Should any issues remain needing resolution prior to allowance, the Examiner is requested to contact applicant's undersigned representative at the telephone number indicated below.

July 4, 2022

Respectfully submitted,

/robertnissen#64256/

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Electronic Acknowledgement Receipt	
EFS ID:	46108850
Application Number:	16484728
International Application Number:	
Confirmation Number:	1944
Title of Invention:	BLOCKCHAIN MINE AT OIL OR GAS FACILITY
First Named Inventor/Applicant Name:	Stephen Barbour
Customer Number:	130443
Filer:	Robert Anton Nissen/Matthew Froehlick
Filer Authorized By:	Robert Anton Nissen
Attorney Docket Number:	91A-3US
Receipt Date:	04-JUL-2022
Filing Date:	06-JAN-2020
Time Stamp:	19:00:39
Application Type:	U.S. National Stage under 35 USC 371

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Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Foreign Reference	Ref60-WO2013066604A1.pdf	3367914 18f78c711b9bba741676f8227f53f0afe5fe6f8f	no	66

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2	Foreign Reference	Ref61-WO2014130972A1.pdf	3530979 e79f5361ec9e3945613248f4acba5abeea8ee350	no	57
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	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Request for Reconsideration-After Non-Final Rejection	1	1
	Claims	2	9
	Applicant Arguments/Remarks Made in an Amendment	10	16

Warnings:	
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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.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16/484,728
Filing Date	2020-01-06
First Named Inventor	BARBOUR, Stephen
Art Unit	3688
Examiner Name	REAGAN, JAMES A
Attorney Docket Number	91A-3US

U.S. PATENTS

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
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	First Named Inventor	BARBOUR, Stephen
	Art Unit	3688
	Examiner Name	REAGAN, JAMES A
	Attorney Docket Number	91A-3US

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	First Named Inventor	BARBOUR, Stephen
	Art Unit	3688
	Examiner Name	REAGAN, JAMES A
	Attorney Docket Number	91A-3US

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	Filing Date	2020-01-06
	First Named Inventor	BARBOUR, Stephen
	Art Unit	3688
	Examiner Name	REAGAN, JAMES A
	Attorney Docket Number	91A-3US

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	First Named Inventor	BARBOUR, Stephen
	Art Unit	3688
	Examiner Name	REAGAN, JAMES A
	Attorney Docket Number	91A-3US

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	48	8001403	B2	2011-08-16	James R Hamilton	
	49	8006108	B2	2011-08-23	Thomas M. Brey	
	50	8031468	B2	2011-10-04	John H. Bean	
	51	8047904	B2	2011-11-01	Randall A. Yates	
	52	8051672	B2	2011-11-08	Paul Mallia	

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	53	8070863	B2	2011-12-06	Andreas Tsangaris	
	54	8080900	B2	2011-12-20	Selver Corhodzic	
	55	8094436	B2	2012-01-10	Patrick W. Mills	
	56	8113010	B2	2012-02-14	Andrew B. Carlson	
	57	8180501	B2	2012-05-15	Andrew J. Lewis	
	58	8184435	B2	2012-05-22	John H. Bean	
	59	8203837	B2	2012-06-19	Roy Zeighami	
	60	8203841	B2	2012-06-19	Yao-Ting Chang	
	61	8214843	B2	2012-07-03	Gregory J. Boss	
	62	8233270	B2	2012-07-31	Thomas L. Pierson	
	63	8248795	B2	2012-08-21	Yao-Ting Chang	

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	65	8250382	B2	2012-08-21	Stephen C. Maglione	
	66	8251785	B2	2012-08-28	Ty Schmitt	
	67	8254122	B2	2012-08-28	Yao-Ting Chang	
	68	8260913	B2	2012-09-04	Adam Knapp	
	69	8261275	B2	2012-09-04	Darrin P. Johnson	
	70	8264840	B2	2012-09-11	Rudy Bergthold	
	71	8286442	B2	2012-10-16	Andrew B. Carlson	
	72	8300402	B2	2012-10-30	Chao-Ke Wei	
	73	8305737	B2	2012-11-06	Carrel W. Ewing	
	74	8312229	B2	2012-11-13	Rudolf Henricus Johannes Bloks	

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	76	8320128	B2	2012-11-27	Chao-Ke Wei	
	77	8322155	B2	2012-12-04	Ozan Tutunoglu	
	78	8331086	B1	2012-12-11	Alan P. Meissner	
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	80	8332670	B2	2012-12-11	Hideharu Kato	
	81	8360833	B2	2013-01-29	Roy Grantham	
	82	8370517	B2	2013-02-05	Patrick Joseph Bohrer	
	83	8374928	B2	2013-02-12	Sandeep Gopisetty	
	84	8405977	B2	2013-03-26	Tai-Wei Lin	
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	87	8447993	B2	2013-05-21	Daniel H. Greene	
	88	8457796	B2	2013-06-04	Deepinder Singh Thind	
	89	8462496	B2	2013-06-11	Ty Schmitt	
	90	8498110	B2	2013-07-30	Chao-Ke Wei	
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	92	8600556	B2	2013-12-03	Clay G. Nesler	
	93	8627123	B2	2014-01-07	Navendu Jain	
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	110	8849715	B2	2014-09-30	Joseph W. Forbes	
	111	8887498	B2	2014-11-18	Todd A. Frerichs	
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	114	8931221	B2	2015-01-13	Ankit SOMANI	
	115	8941256	B1	2015-01-27	Michael P. Czamara	
	116	8964374	B1	2015-02-24	Honggang Sheng	
	117	8965594	B2	2015-02-24	David Marcus	
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	124	9063738	B2	2015-06-23	Navendu Jain	
	125	9065582	B2	2015-06-23	Richard A. Barry	
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	131	9144181	B2	2015-09-22	Scott Wiley	
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	133	9218035	B2	2015-12-22	Tao Li	
	134	9232024	B2	2016-01-05	David Robert SUFFLING	
	135	9252598	B2	2016-02-02	Christian L. Belady	
	136	9268613	B2	2016-02-23	Paul Barham	
	137	9271429	B2	2016-02-23	Koichi Mashiko	
	138	9282022	B2	2016-03-08	William Brad MATTHEWS	
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	150	9414531	B1	2016-08-09	Richard Chadwick Towner	
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	153	9447992	B2	2016-09-20	Kelly Johnson	
	154	9450838	B2	2016-09-20	Navendu Jain	
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	157	9552234	B2	2017-01-24	Sergey BOLDYREV	
	158	9559520	B2	2017-01-31	John Christopher Shelton	
	159	9568975	B2	2017-02-14	Naresh K. Sehgal	
	160	9585291	B2	2017-02-28	Christian L. Belady	
	161	9588558	B2	2017-03-07	Gregory Joseph McKnight	
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	164	9618991	B1	2017-04-11	Jimmy Clidaras	
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	177	9778718	B2	2017-10-03	Carl Edvard Martin Zacho	
	178	9795062	B1	2017-10-17	Peter George Ross	
	179	9800052	B2	2017-10-24	Tao Li	
	180	9800167	B2	2017-10-24	Eddy C. Aeloiza	
	181	9839163	B2	2017-12-05	Earl Keisling	
	182	9886316	B2	2018-02-06	Christian L. Belady	
	183	9933804	B2	2018-04-03	Brian Janous	
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	188	10003200	B2	2018-06-19	Kristian Budde	
	189	10009232	B2	2018-06-26	Tyler B. Duncan	
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	191	10037061	B1	2018-07-31	Rajan Panchapakesan	
	192	10039211	B2	2018-07-31	Colton Malone Crawford	
	193	10063629	B2	2018-08-28	Tyler B. Duncan	
	194	10067547	B2	2018-09-04	Enrique G. Castro-Leon	
	195	10078353	B2	2018-09-18	Miroslaw Klaba	

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	197	10128684	B2	2018-11-13	Shankar Ramamurthy	
	198	10199669	B2	2019-02-05	Di Wang	
	199	10234835	B2	2019-03-19	Jie Liu	
	200	10257268	B2	2019-04-09	Andrew Brian Cencini	
	201	10271486	B2	2019-04-30	Brad MCNAMARA	
	202	10275842	B2	2019-04-30	Ja-Chin Audrey Lee	
	203	10283968	B2	2019-05-07	Mohammad N. ElBsat	
	204	10289190	B2	2019-05-14	Gregory J. Boss	
	205	10326661	B2	2019-06-18	Ashish Munjal	
	206	10339227	B1	2019-07-02	Andrew B. Carlson	

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	208	10356954	B2	2019-07-16	Yu Bao	
	209	10368467	B2	2019-07-30	Andrew Gold	
	210	10404523	B2	2019-09-03	Andrew Brian Cencini	
	211	10452532	B2	2019-10-22	Jeffrey L. McVay	
	212	10454772	B2	2019-10-22	Steven White	
	213	10465492	B2	2019-11-05	Joseph A. Ricotta	
	214	10488061	B2	2019-11-26	John Costakis	
	215	10497072	B2	2019-12-03	Ali Hooshmand	
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	219	10637353	B2	2020-04-28	Soichiro Ohyama	
	220	10739042	B2	2020-08-11	Ming Zhang	
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	225	10931117	B2	2021-02-23	Patrick Robert Shoemaker	
	226	10974194	B2	2021-04-13	Ahmed Khalifah Al Muhsen	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/484,728
	Filing Date	2020-01-06
	First Named Inventor	BARBOUR, Stephen
	Art Unit	3688
	Examiner Name	REAGAN, JAMES A
	Attorney Docket Number	91A-3US

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	Examiner Name	REAGAN, JAMES A
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	Art Unit	3688
	Examiner Name	REAGAN, JAMES A
	Attorney Docket Number	91A-3US

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		☐

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	

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[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	16/484,728
	Filing Date	2020-01-06
	First Named Inventor	BARBOUR, Stephen
	Art Unit	3688
	Examiner Name	REAGAN, JAMES A
	Attorney Docket Number	91A-3US

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	/RobertNissen#64256/	Date (YYYY-MM-DD)	2022-07-04
Name/Print	Robert A. Nissen	Registration Number	64256

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.**

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Electronic Acknowledgement Receipt	
EFS ID:	46108796
Application Number:	16484728
International Application Number:	
Confirmation Number:	1944
Title of Invention:	BLOCKCHAIN MINE AT OIL OR GAS FACILITY
First Named Inventor/Applicant Name:	Stephen Barbour
Customer Number:	130443
Filer:	Robert Anton Nissen/Matthew Froehlick
Filer Authorized By:	Robert Anton Nissen
Attorney Docket Number:	91A-3US
Receipt Date:	04-JUL-2022
Filing Date:	06-JAN-2020
Time Stamp:	18:49:36
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Foreign Reference	Ref01-AU2009203009A1.pdf	744572 23aca5b369450de070bcf56ab906cc35b97f 8dad	no	29

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Warnings:					
Information:					

51	Foreign Reference	Ref57-WO2012177769A1.pdf	4606784 9e228abf529a30afa659d2966157e6422e0550e6	no	96
Warnings:					
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52	Foreign Reference	Ref58-WO2013022501A1.pdf	919296 7af09e2379e62aa08efe387de9cee61e129c8462	no	27
Warnings:					
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53	Foreign Reference	Ref59-WO2013066602A1.pdf	3460247 8bc5d6ae99cad4dd9aa958360cd0e70cd7207cd7	no	67
Warnings:					
Information:					
54	Information Disclosure Statement (IDS) Form (SB08)	91A-3US_IDS.pdf	213213 5af1efd51b06dc2b1704a3013b539780ec2e48fb	no	36
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55	Foreign Reference	Ref24-EP2721710B1.pdf	2505712 2d9496e0096305253716 56e00da03835db1f4276	no	26
Warnings:					
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56	Foreign Reference	Ref27-EP2036189A2.pdf	3160600 c01b999a12608a59d6f9a9df24693301b411d3b7	no	52
Warnings:					
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57	Foreign Reference	Ref28-EP2074337A2.pdf	3221216 1e78782dc4451d2dc7206726064934c11de48366	no	46
Warnings:					
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58	Foreign Reference	Ref30-EP2446516A2.pdf	14095231 15f0d615ebe4e0e5784b571ece716059be38472b	no	216
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59	Foreign Reference	Ref49-CA2793537A1.pdf	4869346 849ec28562b6dc44f7650ba7296f2c855d3bcd8b	no	95
Warnings:					
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60	Foreign Reference	Ref51-WO2015199629A1.pdf	1364135 22fc5c939c77b837cd531ff815a837a33ccfae3f	no	21
Warnings:					
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		Total Files Size (in bytes):	113448763		

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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.

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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

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PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/484,728	Filing Date 01/06/2020	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

	(Column 1)	(Column 2)			
FOR	NUMBER FILED	NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ 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	07/04/2022	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 41	Minus	** 41	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

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

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/BURNELL L ROSS/
*** 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.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/484,728	01/06/2020	Stephen Barbour	91A-3US	1944

130443 7590 06/17/2022

Nissen Patent Law
#200, 10328- 81 Ave
Edmonton, ALBERTA T6E1X2
CANADA

EXAMINER	
REAGAN, JAMES A	

ART UNIT	PAPER NUMBER
3688	

MAIL DATE	DELIVERY MODE
06/17/2022	PAPER

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.

Applicant-Initiated Interview Summary	**Application No.** 16/484,728	**Applicant(s)** Barbour, Stephen		
	Examiner JAMES A REAGAN	**Art Unit** 3688	**AIA (First Inventor to File) Status** Yes	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
JAMES A REAGAN	Primary Examiner	Telephonic
Robbie Nissen	Attorney of Record	

Date of Interview: 15 June 2022

Issues Discussed:

Proposed Amendment(s)

Discussed the proposed amendments. The Examiner has reviewed the prior art of record as well as the IDS submitted 06/03/2022. The made suggestions regarding claim construction. Applicant's representative will file a formal response and an updated search and evaluation will be conducted at that time. No agreements were reached.

☑ Attachment

/JAMES A REAGAN/ Primary Examiner, Art Unit 3688	

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

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

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

Agenda summary:

1. Discuss potential amendment to claim 24.
2. Discuss support and advantages.
3. Discuss the prior art.

Potential claim 24 amendment:

24. (Currently amended) A method comprising:

using a source of combustible gas produced at a hydrocarbon production well, storage, or processing facility, to produce electricity to operate a blockchain mining device located at the hydrocarbon production well, storage, or processing facility, respectively; and

prior to using the source of combustible gas:

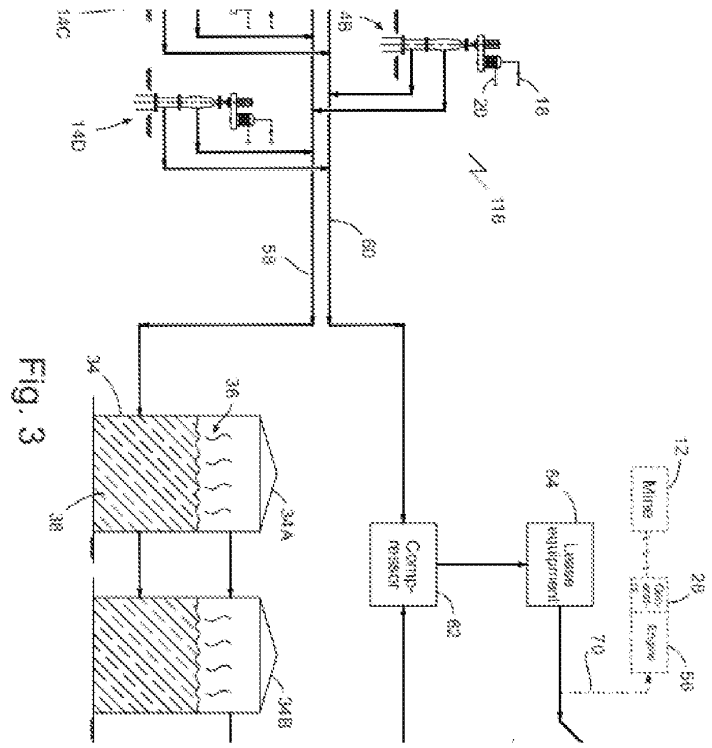
disconnecting or diverting the source of combustible gas from a combustible gas disposal device at the hydrocarbon production well, storage, or processing facility; and

connecting the source of combustible gas to operate the blockchain mining device;

in which the combustible gas disposal comprises one or more of a flare, a vent to the atmosphere, an incinerator, or a burner.

Application excerpts:

Fig. 3:



Para. 47:

Referring to Fig. 3, the source of combustible gas may be an oil storage or processing unit, for example a production storage tank or tanks 34A-B. The tanks 34 may store emulsion, for example a mixture of oil and water, which may be supplied via one or more emulsion or oil lines 58 from wells 14A-D. The source of natural gas may comprise oil storage production tank 34 connected to receive oil produced from the remote oil well 14. Oil storage production tank 34 may store, and in some cases separate, emulsion 38, which may release vapor such as combustible gas 36 over time. A gas outlet, such as a vapor recovery unit 66, may be connected to supply natural gas from the oil storage production tank 34 to the engine 56. A compressor 62 or other suitable device may be used to pressurize the gas supplied to engine 56. The engine 56 and generator 28 may form a standalone unit or may be connected for other functions on the site, such as to pump a well or power communications or electrical equipment. Pressurized natural gas from compressor 62 may be used to fuel lease equipment 64, such as control equipment, communications equipment, surveillance equipment, heaters, or other components. Excess or unused gas may be directed to a gas disposal or storage device such as an atmospheric vent or combustion device, in this case a flare 68. Gas may be diverted from flare 68 to engine 56 via an excess gas line 70.

Para. 48:

[0048] Referring to Fig. 3, in some cases a method of installing the system 10 on site includes reducing the amount of combustible gas that is wasted on site. For example, the method of install may include disconnecting the source of combustible gas, in this case from tanks 34 and/or line 60, from an atmospheric vent or combustion device, in this case flare 68, or to atmosphere via a vent 52 (Fig. 1). The source of combustible gas may be initially connected to operate the blockchain mining device 12. Once disconnected, the atmospheric vent or combustion device may be unused in the future, or may be used only in certain circumstances. In some cases combustible gas is diverted at least partially from the atmospheric vent or combustion device to operate the blockchain mining device 12, so that relatively less gas is wasted during operation. In such cases the flare 68 may remain connected to the source of gas, for example to receive a lesser feed of gas than prior to the installation of mining device 12, and in other cases to receive diverted excess gas in certain circumstances for example as described further elsewhere in this document. An atmospheric vent or combustion device is an example of a gas disposal device, and includes a flare, a vent to the atmosphere, an incinerator, a burner, and other suitable devices.

Para. 74:

Referring to Fig. 1, while the power load level is set to the daily minimum, the excess gas or electricity may be addressed in a suitable fashion. In the example shown, excess electricity produced by the generator 28 is diverted to an electricity disposal device, in this case a load bank 32 when the production rate is above the daily minimum production rate 155B. In some cases the controller 86 or another suitable device, may divert excess gas from reaching engine 24, for example to a suitable gas disposal or storage device, such as an atmospheric vent, a flare, or other device. One or more valves, such as an instrumented valve, may be used for such diversion. In some cases excess gas sent to the engine will automatically divert to disposal through the gas tree, as such equipment may already have pressure regulation installed and set such that above a certain pressure excess gas is diverted to vent or flare. The load bank may be controlled to load up the engine so that all power generated in excess of the required amount to power the mine can be dissipated in the load bank as heat. In such a fashion the user can eliminate venting altogether as long as the engine is sized to consume the maximum available gas supply.

Para. 32:

A source of natural gas may be located at a remote oil and gas site, for example one that is lacking in accessible infrastructure such as an external pipeline network (sales line) or external power grid to sell into. In many locations it may not be economically feasible to build the infrastructure required to take the produced gas, or resultant electricity generated by combustion of the gas, to market, for example due to significant capital expense required or when the volume of gas is insufficient to pay out the investment. In such cases, the operator is forced to do something with the excess or stranded gas and is left with few options. Such options currently include venting the gas to atmosphere un-combusted, combusting the gas on site via flare, incinerator, or combustor, or worst case scenario ceasing production of the gas source, for example shutting in the oil well.

Para. 33:

excess gas to atmosphere is the most cost effective option for the operator but may have the most negative impact on the environment, as excess natural gas is regarded as 25-35 times worse than CO_2 as a greenhouse gas on a 100 year global warming potential timescale. Currently, venting

gas to atmosphere is a common occurrence in oil production all over the world, as few jurisdictions restrict this practice.

Para. 34:

Combustion disposal options, while more environmentally friendly than venting, represent a significant capital expense and do not provide utility for the operator. Combustion options include, but are not limited to, flaring and incineration. Combustion disposal methods produce waste heat and essentially represent waste of the potential energy of the gas. Such options may represent a capital liability to the operator, as such do not generate any revenue. Both combustion and venting can pose health concerns to nearby residents and are typically considered a nuisance.

Para. 30:

The end user of natural gas needs to be assured of two conditions before committing to the use of gas in a home or factory: the gas must be of consistent quality, meeting sales gas specifications, and the supply of gas must be available at all times at the contracted rate. Gas treating facilities, therefore, must be designed to convert a particular raw gas mixture into a sales gas that meets the sales-gas specifications, and such facilities must operate without interruption. Typical processing steps include inlet separation, compression, gas sweetening, sulfur recovery or acid gas disposal, dehydration, hydrocarbon dewpoint control, fractionation and liquefied petroleum gas (LPG) recovery, and condensate stabilization. Sales gas specifications may vary by jurisdiction, although Table 1 below illustrates a typical specification. A sales gas line may be a pipeline of more than ten km of length, in some cases more than fifty, a hundred, or two hundred, kilometers in length, and connecting between an oil and gas site and travelling to an end user, a processing site, or a distribution site.

Para. 35:

Selling excess gas to a pipeline, i.e. a sales gas line, or using the gas to generate electricity to sell to an external power grid may be ideal options, but such options may require a significant capital expense when there is no infrastructure nearby. To pay off the capital expense, the volume of excess gas must be significant and the supply must also be guaranteed for the payout period. This is often not the case in many upstream oil production activities, as gas volumes associated with oil production can quickly diminish. Many remote oil and gas sites are located in unpopulated areas that are hundreds of kilometers outside of the nearest town, and of which no viable sales option is economically feasible.

Para. 36:

An external power grid may be an electrical power transmission system comprising overhead or underground wiring, often supplying electricity in polyphase form, and spanning an electrical substation to an oil and gas site. Long-distance electricity transmission is typically carried with high voltage conductors. Transmission lines traverse large regions and require numerous support towers, often spanning hundreds of kilometers from generation to distribution and end use. Substations transform power from transmission voltages to distribution voltages, typically ranging from 2400 volts to 37,500 volts.

Para. 55:

> Mining is the process of adding transaction records to BITCOIN (TM)'s public ledger of past transactions. This ledger of past transactions is called the blockchain as it is a chain of blocks. The blockchain serves to confirm transactions to the rest of the network as having taken place. BITCOIN (TM) nodes use the blockchain to distinguish legitimate BITCOIN (TM) transactions from attempts to re-spend coins that have already been spent elsewhere. Mining may be intentionally designed to be resource-intensive and difficult so that the number of blocks found each day by miners remains steady. Individual blocks may be required to contain a proof-of-work to be considered valid. This proof-of-work is verified by other BITCOIN (TM) nodes each time they receive a block. BITCOIN (TM) uses the hashcash proof-of-work function.

Gleichauf excerpts:

Para. 4:

> In this high - intensity computing environment with ever - more - difficult blockchain puzzles, a likelihood of a miner without highly specialized hashing hardware capable of more effectively and / or efficiently finding a solution to a blockchain puzzle is rather small. As such, blockchain's incentive system encourages miners to adopt more efficient technology and, thereby, at least keep up with escalating difficulty of mining each new generation of blocks, and indirectly to jostle to monopolize potential earnings through utilizing continuously improved mining technology. Today, to make mining profitable or sustainable, miners may utilize application - specific integrated circuits (ASICs) with a significant hashing power, such as in relation to graphic processing units (GPUs), field programmable gate arrays (FGPA), etc. used in the past. As such, mining has become a business with significant capital costs (e.g., for an ASIC accelerated hash computation system, a place to house it, network connections, etc.) as well as operating costs (electricity, monitoring personnel, etc.), meaning that ASIC miners geographically clustered near cheaper electrical power and / or cooler climates (e.g., for ASIC heat dissipation, etc.), for example, may gain an unfair advantage over other miners on a network. As a result, blockchain mining has become increasingly concentrated in particular geographic areas, such as in cooler (e.g., mountainous, etc.) places with readily accessible (e.g., unregulated, etc.) and / or cheaper hydro power, for example.

Para. 60:

> In at least one implementation, a reward and/or fee may, for example, depend and/or be based, at least in part, on an individual contribution to a block validation of at least some of the plurality of nodes, a shared contribution to a block validation of at least some of the plurality of nodes, or any combination thereof. For example, in some instances, a reward and/or fee may be allocated to a miner that individually contributed to solving a particular blockchain puzzle due, at least in part, to its more effective and/or more efficient mining hardware, such as a built-in cryptographic hash accelerator. At times, however, such as to ensure fairness to miners with less effective and/or less efficient (e.g., older, etc.) hardware, an MSP or any other suitable party may, for example, coordinate mining activity of a plurality of miners via splitting a work of searching for a blockchain solution and rewarding these miners according to their shared contribution. For example, here, if a particular mining node of these plurality of nodes finds a valid proof of work for a block, an MSP (or some other party) may allocate a reward and/or fee in proportion to a number of hashing operations or some other effort (e.g., availability of a miner during a billing cycle, etc.) the plurality of nodes contributed to solving the block. Again, these are merely examples relating to an individual and/or shared contribution, and claimed subject matter is not so limited. Any other suitable types of contributions to a shared mining effort may, for example, be used herein, in whole or in part, or otherwise considered. Shared contributions may also be verified via, for example, a consensus approach, network-wide or otherwise, and may be recorded in a sidechain, such as for purposes of billing, tracking, or the like.

Belady excerpts:

Para. 1:

> The throughput of communications between multiple computing devices continues to increase. Modern networking hardware enables physically separate computing devices to communicate with one another orders of magnitude faster than was possible with prior generations of networking hardware. Furthermore, high-speed network communication capabilities are being made available to a greater number of people, both in the locations where people work, and in their homes. As a result, an increasing amount of data and services can be meaningfully provided via such network communications. As a result, the utility of computing devices increasingly lies in their ability to communicate with one another. For example, users of computing devices traditionally used to utilize computing devices for content creation, such as the creation of textual documents or graphical images. Increasingly, however, the most popular utilizations of computing devices are in the browsing of information sourced from other computing devices, the interaction with other users of other computing devices, the utilization of the processing capabilities of other computing devices and the like.

Para. 2:

> In particular, it has become more practical to perform digital data processing at a location remote from the location where such data is initially generated, and where the processed data will be consumed. For example, a user can upload a digital photograph to a server and then cause the server to process the digital photograph, changing its colors and applying other visual edits to it. In such an example, the digital processing, such as of the photograph, is being performed by a device that is remote from the user. Indeed, in such an example, if the user was utilizing a battery-operated computing device to interact with the server such as, for example, a laptop or smartphone, the user could be in a location that was not receiving any electrical power at all. Instead, electrical power can have been delivered to the server, which is remote from the user, and the server can have utilized electrical power to process the data provided by the user and then return the processed data to the user.

Para. 4:

> However, data centers often consume large quantities of electrical power, especially by the computing devices themselves. Increasingly, the cost of obtaining such electrical power is becoming a primary determinant in the economic success of a data center. Consequently, data centers are being located in areas where the data centers can obtain electrical power in a cost-effective manner. In some instances, data centers are being located in areas that can provide inexpensive electrical power directly, such as areas in which electricity can be purchased from electrical utilities or governmental electrical facilities inexpensively. In other instances, however, data centers are being located in areas where natural resources, from which electrical power can be derived, are abundant and can be obtained inexpensively. For example, natural gas is a byproduct of oil drilling operations and is often considered a waste byproduct since it cannot be economically captured and brought to market. Consequently, in areas where oil drilling operations are being conducted, natural gas is often available for free, or at a minimal cost. As will be recognized by those skilled in the art, natural gas can be utilized to generate electrical power, such as, for example, through a fuel cell or by generating steam to drive a steam powered electrical generator. As another example, municipal landfills and other like waste treatment and processing centers can produce a gas commonly referred to as “biogas” which can, likewise, be utilized to generate electrical power that can, then, be consumed by the computing devices of a data center. Unfortunately, gas that is available at reduced cost cannot always be provided at a well-maintained pressure. Instead, the pressure at which such gases are provided can often vary

substantially, including both positive and negative gas pressure spikes where the pressure of the provided gas increases, or decreases, respectively. Not only can such gas pressure spikes damage equipment that utilizes such gas, but they can also be disruptive to the entire gas supply network.

Para. 28:

Although not part of a gas supply shock absorber, the system 100 of FIG. 1 also illustrates an optional gas quality sensor 131 that can be communicationally coupled to a gas diverter valve 133 via the communicational connection 132. As indicated previously, in one embodiment, the gas supply 110 can be from non-regulated gas sources, such as the gas produced from a landfill, or gas produced as a waste product of oil drilling. As will be recognized by those skilled in the art, such gas can contain impurities that can damage various gas-consuming equipment such as, for example, the gas-to-electricity converter 180. For example, such gas can comprise too much sulfur, carbon dioxide, siloxanes, or other like impurities. Thus, in one embodiment, a gas quality sensor 131 can be positioned to monitor the quality of the gas received from the gas supply 110. Should the gas quality sensor 131 detect that the quality of gas being provided is no longer acceptable, the gas diverter valve 133 can be triggered and the gas provided by the gas supply 110 can be vented as vented gas 111. The gas quality sensor 131 and the gas diverter valve 133 can be spaced sufficiently apart such that the gas diverter valve 133 can trigger prior to the arrival of the gas, down the piping 120, that was deemed to be of insufficient quality by the gas quality sensor 131 as such gas passed its detection.

Para. 29:

While the system 100 of FIG. 1 is shown as comprising a data center 190, the above-described gas supply shock absorber does not require any such data center 190 and can operate equally well with any gas-consuming entity. Nevertheless, in one embodiment, an advantage of a gas consuming entity, such as the data center 190 in combination with a gas-to-electricity converter 180 that provides electrical power 181 to the data center 190, can be that such an entity can dynamically vary the amount of gas consumed in response to variations in the system 100. For example, the data center 190 can comprise a communicational connection 191 to a network 199, as illustrated in the system 100 of FIG. 1, through which the data center 190 can communicate with other data centers, including remotely located data centers, which also comprise their own communicational connections to the network 199. Such a communicational connection 191 to the network 199 can enable the data center 190 to request additional processing work from other data centers, thereby increasing its consumption of the electrical power 181, in turn increasing the amount of gas consumed by the gas-to-electricity converter 180. Similarly, the communicational connection 191 to the network 199 can enable the data center 190 to offload processing work to the other data centers, thereby decreasing its consumption of electrical power 181, in turn decreasing the amount of gas consumed by the gas-to-electricity converter 180.

Para. 38:

The steps of the flow diagram 200 of FIG. 2 can be performed by one or more of the computing devices of the data center, or can be performed by one or more computing devices that are remote from the data center. Turning to FIG. 3, an exemplary general-purpose computing device, such as one of the one or more computing devices that can perform the steps of the flow diagram of FIG. 2, is illustrated in the form of the exemplary general-purpose computing device 300. The exemplary general-purpose computing device 300 can include, but is not limited to, one or more central processing units (CPUs) 320, a system memory 330 and a system bus 321 that couples various system components including the system memory to the processing unit 320. The system bus 321 may be any of several types of bus structures including a memory bus or memory controller, a peripheral bus, and a local bus using any of a variety of bus architectures. Depending

on the specific physical implementation, one or more of the CPUs 320, the system memory 330 and other components of the general-purpose computing device 300 can be physically co-located, such as on a single chip. In such a case, some or all of the system bus 321 can be nothing more than communicational pathways within a single chip structure and its illustration in FIG. 3 can be nothing more than notational convenience for the purpose of illustration.

PTO/SB/08a (02-18)
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First Named Inventor	Stephen Barbour
Art Unit	
Examiner Name	
Attorney Docket Number	91A-3US

U.S.PATENTS

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U.S.PATENT APPLICATION PUBLICATIONS

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	20160330031		2016-11-10	Drego et al.	

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FOREIGN PATENT DOCUMENTS

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	1	2016067295	WO		2016-05-06	Spondoolies Tech LTD.		☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16484728
	Filing Date	2018-02-06
	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

	1	THESELFGOVERNED, Electricity Consumption: Bitcoin mining vs The current global financial system, Reddit, posted June 5, 2014, 15 pages.	☐
	2	MIA BENNETT, Blog - Bitcoin mining: The next rush to hit the Arctic?, posted February 6, 2018, 14 pages.	☐
	3	PYMNTS, China Moves To Squeeze Out Bitcoin Mining, posted January 10, 2018, 7 pages.	☐
	4	Cryptocurrency investors eye provinces with low electricity rates, The Fraser Institute Blog, posted January 31, 2018, 3 pages.	☐
	5	JCHI2210, Free natural gas, is it worth it to use a Natural gas generator?, Bitcoin Forum, posted August 27, 2017, 7 pages.	☐
	6	AMANDA STEPHENSON, Genalta Power earns carbon offsets for turning flare gas into electricity, Calgary Herald, posted September 30, 2014, 6 pages.	☐
	7	KENYN, Saving the environment through bitcoin; one transaction equals 117 recycled bottles, Reddit, posted February 26, 2017, 17 pages.	☐
	8	KINOLVA, Shower Thought: Mining Bitcoin for Heat / Hot Water?, Reddit, posted January 28, 2017, 14 pages.	☐
	9	The Best Places in The World to Mine Bitcoin, PRNewswire, posted January 18, 2018, 8 pages.	☐

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	Application Number	16484728
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	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

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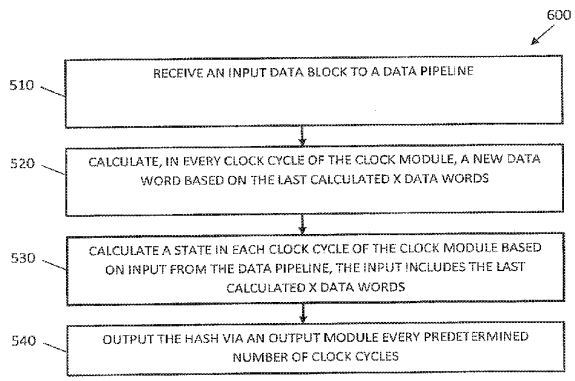


Figure 11

(57) Abstract: A method and engine for hash calculation, the method comprising receiving data blocks via an input module, providing clock cycles by a clock module, calculating a hash from a received data block by a process module including a data pipeline and a state pipeline, the hash calculation comprising: an input data block to the data pipeline, the data block includes a sequence of data words including X data words, wherein X is a known number, calculating, in every other clock cycle of the clock module, an new data word based on the last calculated X data words, and performing a stage of the state pipeline in each clock cycle of the clock module, in which a state is calculated based on input from the data pipeline, the input includes the last calculated X data words, and outputting the hash via an output module every predetermined number of clock cycles.

WO 2016/067295 A1

METHOD AND SYSTEM FOR REDUCING POWER CONSUMPTION IN BITCOIN MINING VIA WATERFALL STRUCTURE

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of US provisional patent application No. 62/072,466, filed on October 30, 2014 which is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention relates to implementing bitcoin block chain signing, and more particularly, to implementing same in an efficient engine micro architecture which uses data processing technique to support reduced power consumption.

BACKGROUND OF THE INVENTION

[0003] The most important part of the bitcoin system is a public ledger that records financial transactions in bitcoins. This is accomplished without the intermediation of any single, central authority, as long as mining is decentralized. Instead, multiple intermediaries exist in the form of computer servers running bitcoin software. By connecting over the Internet, these servers form a network that anyone can join. Transactions of the form: "payer X wants to send Y bitcoins to payee Z" are broadcasted to this network using readily available software applications. Bitcoin servers can validate these transactions, add them to their copy of the ledger, and then broadcast these ledger additions to other servers.

[0004] Bitcoin transactions are permanently recorded in a public distributed ledger called the block chain. Approximately six times per hour, a group of accepted transactions, a block, is added to the block chain, which is quickly published to all network nodes. This allows bitcoin software to determine when a particular bitcoin amount has been spent, a novel solution for preventing double-spends in a peer-to-peer environment with no central authority. Whereas a conventional ledger records the transfers of actual bills or promissory notes that exist apart from it, the block chain is the only place that bitcoins can be said to exist. To independently verify the chain-of-ownership of any and every bitcoin amount, full-featured bitcoin software stores its own copy of the block chain.

[0005] Maintaining the block chain is referred to as "mining" and those who do that are rewarded with newly created bitcoins and transaction fees. Miners may be located anywhere

in the world; they process payments by verifying each transaction as valid and adding it to the block chain. Today, payment processing is rewarded with 25 newly created bitcoins per block added to the block chain. To claim the reward, a special transaction called a coinbase is included with the processed payments. All bitcoins in circulation can be traced back to such coinbase transactions. The bitcoin protocol specifies that the reward for adding a block will be halved approximately every four years. Eventually, the reward will be removed entirely when an arbitrary limit of 21 million bitcoins is reached circa 2140, and transaction processing will then be rewarded by transaction fees solely.

[0006] Recently, mining has become very competitive, and ever more specialized technology is utilized. The most efficient mining hardware makes use of custom designed application-specific integrated circuits (ASIC), which outperform general purpose CPUs and use less power as well. Without access to these purpose built machines, a bitcoin miner is unlikely to earn enough to even cover the cost of the electricity used in his or her efforts.

[0007] Bitcoin chain block consists of transactions that need to be executed that are preceded by header. All the transactions are signed using a Merkle Tree implementation and the signature is embedded in the block header, the block header also needs to be signed by double hash that meets certain conditions in order to become a valid signature that is accepted by the network.

[0008] A Merkle tree is a binary tree that is used in bitcoin to summarize all the transactions in a block, producing an overall digital fingerprint of the entire set of transactions. A Merkle tree is constructed by recursively hashing pairs of nodes until there is only one hash, called the *root*, or *Merkle root*.

[0009] A bitcoin block chain holds the actual transactions and is signed by signing the transactions and the header. The header is the heart of all the bitcoin mining mechanism and is used in order to secure the bitcoin by design as well as driving bitcoin mining efforts.

[0010] The mining algorithm for Bitcoins is done by signing the header of each message. Every miner gets a header to sign from a pool which distributes headers to a group of miners. The miner needs to perform the following Hash function in order to find a signature of the header as shown in Equation 1 below:

$$Signature = SHA\text{-}256(SHA\text{-}256(Block\_Header))$$

Eq. (1)

[0011] The function SHA256 produces a hash with 256 bits. After finding the signature, the miner can know if the header is a valid header and can be sent to the network as a successful transaction. There are very rare cases where the header is valid.

[0012] A header is valid only when the signature is smaller than the Target (Bits) in the header. The target is a 256-bit number (extremely large) that all Bitcoin clients share. The SHA-256 hash of a block's header must be lower than or equal to the current target for the block to be accepted by the network. The lower the target, the more difficult it is to generate a block.

[0013] The header includes the following fields: version, previous block hash, Merkle root, timestamp, bits and nonce. SHA-256 is calculated over chunks of 512 bits. The block header can be divided to two chunks adding a padding field of 384b. The first chunk (Chunk 1) includes the version, the previous block hash and a main portion (for example, 224 bits out of 256 bits) of the Merkle root hash. The second chunk (Chunk 2) may include a marginal portion of the Merkle root hash (for example, 32 bits), the timestamp, bits, nonce and the padding field. The version and the padding sections are constant. The previous block hash, the timestamp and the bits sections are changed for each new block header. The Merkle root hash can be changed by the miner within a given header by influencing the Merkle root and the nonce is the dynamic portion which is scanned by the miner in order to look for the signature.

[0014] In order to find the header structure that will create a valid signature (less than the target), the miner is allowed to change the 32b nonce value. The miner can increment the nonce value for every trial and check for a signature, in order to cover all options a 2^32 trials are needed, which may lead to no resolution and then a new header format should be attempted. (a new header format is created by using a different Merkle root that is extracted from the list of transactions in the message).

[0015] In order to focus on the hash algorithm and optimization for the nonce scanning (2^32 iterations), we will just assume that the miner has an option to change the Merkle root and start a new round of nonce scanning using a new header structure and look for a valid signature again.

[0016] As mentioned above, the signature is calculated by applying SHA-256(SHA-256(Header)). The first chunk is hashed first, providing the mid-state hash (H0). H0 is the

initial vector (IV) that is used to load the initial state of the SHA of the second chunk which produces that intermediate result of the SHA(Header), This then goes to another SHA function that produces the signature. Therefore, the process involves three SHA iterations (each SHA iteration takes approximately 64 cycles). The mid-state H0 is calculated once per header, usually by the host computer. The next two hashes are the performance calculations and may be carried out by hardware acceleration.

[0017] As described above the transactions are signed using a Merkle root hash. The Merkle root can be manipulated by adding a coinbase transaction to the network transactions. As mentioned above, a coinbase transaction belongs to the miner and can be used to get the mining fees.

[0018] Power efficiency of the aforementioned double hash architecture plays a critical factor in the engine implementation. In known engine implementations, the engine toggles every clock and the power consumption is split between the logic and the flop flops more or less evenly. The flip flop power is dictated by the shift between stages of the engine. In the known implementations, the shift between stages happens every clock cycle and is a significant contributor to the overall power consumption, as well as the repeating data processing.

SUMMARY OF THE INVENTION

[0019] Embodiments of the present invention may provide a method and system for reducing power consumption in bitcoin mining via waterfall structure, the system may include a hash engine, including an input module for receiving data blocks, a memory, a clock module to provide clock cycles, a process module including a data pipeline and a state pipeline for calculating a hash from a received data block, and an output module to output the hash every predetermined number of clock cycles.

[0020] The process module according to some embodiments of the present invention may be configured to receive an input data block to the data pipeline, the data block includes a sequence of data words including X data words, wherein X is a known number, calculate, in every clock cycle of the clock module, a new data word based on the last calculated X data words, and perform a stage of the state pipeline in each clock cycle of the clock module, in which a state is calculated based on input from the data pipeline, the input includes the last calculated X data words. In some embodiments of the present invention, X is equal 16, and wherein each data word is of 32 bits.

[0021] In some embodiments of the present invention, the calculated state includes a sequence of eight state words, wherein the process module is further configured to calculate, in each clock cycle, a first and fifth new state words of the sequence, in order to form a new state of sequenced eight words based of the previous state's words.

[0022] In some embodiments of the present invention, after X clock cycles, a new input data block is inserted instead of the first X data words of the previously inserted input data block.

[0023] In some embodiments of the present invention, the engine has an array arrangement, the array has X columns to which input data blocks can be inserted, wherein the engine is configured to receive a new input data blocks to another of the X columns on every clock cycle, once the first X data words in the column become irrelevant. In some embodiments of the present invention, each column may include up to four different input data blocks in process. In some embodiments of the present invention, the engine is further configured to provide to a row in said array arrangement, in each clock cycle, multiplexed values from previous rows, to demultiplex the multiplexed values in order to create a new data word in a selected column, and to generate multiplexed word values by multiplexing data words of the row, for generating new words in following rows.

[0024] In some embodiments of the present invention, the engine has an array arrangement in the state pipeline, the array has four columns, to which state sequences can be inserted, each state sequence is represented by four couples of a first and a fifth words, wherein the engine is further configured to receive a new state sequence to another of the four columns on every clock cycle, once the first four couples in the column become irrelevant. The engine may be further configured to provide to a row in said array arrangement, in each clock cycle, multiplexed values from previous rows, to demultiplex the multiplexed values in order to create a new state word in a selected column, and to generate multiplexed word values by multiplexing state words of the row, for generating new words in following rows.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] For a better understanding of embodiments of the invention and to show how the same may be carried into effect, reference will now be made, purely by way of example, to the accompanying drawings in which like numerals designate corresponding elements or sections throughout.

[0026] In the accompanying drawings:

[0027] Figure 1 is a schematic illustration of a SHA-256 hash engine according to embodiments of the present invention;

[0028] Figure 2 is a schematic illustration of a state-of-the-art process for signature calculation, also called herein "the regular implementation";

[0029] Figure 3 is a schematic illustration of a logic circuit diagram representing the logic function that is implemented in order to create an induced data block according to embodiments of the present invention;

[0030] Figure 4 is a schematic illustration of a logic circuit diagram representing the arithmetic logic that is used for calculating the first and fifth state words of the next state in the state pipeline.

[0031] Figure 5 is a schematic diagram illustrating one job being processed in the data (W) section in a simple W waterfall implementation, herein referred to as a W waterfall, according to some embodiments of the present invention.

[0032] Figure 6 is a schematic illustration of a W waterfall array, which allows a new job entry, i.e. new data input, on every cycle, rather than new data every 16 cycles when using one column, according to some embodiments of the present invention.

[0033] Figure 7 is a schematic illustration of an optimized W waterfall array, according to some embodiments of the present invention.

[0034] Figure 8 is a schematic illustration of a simple state waterfall implementation in the state section, representing one job being processed in the state section, according to some embodiments of the present invention.

[0035] Figure 9 is a schematic illustration of an exemplary optimized state waterfall array, according to some embodiments of the present invention.

[0036] Figure 10 is a schematic illustration of the waterfall implementations in the data (W) and state sections, according to some embodiments of the present invention; and

[0037] Figure 11 is a schematic flowchart illustrating a method for hash calculation according to some embodiments of the present invention.

[0038] The drawings together with the following detailed description make apparent to those skilled in the art how the invention may be embodied in practice.

DETAILED DESCRIPTION OF THE INVENTION

[0039] With specific reference now to the drawings in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of the preferred embodiments of the present invention only, and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the invention. In this regard, no attempt is made to show structural details of the invention in more detail than is necessary for a fundamental understanding of the invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the invention may be embodied in practice.

[0040] Before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and the arrangement of the components set forth in the following description or illustrated in the drawings. The invention is applicable to other embodiments or of being practiced or carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein is for the purpose of description and should not be regarded as limiting.

[0041] Reference is now made to **Figure 1**, which is a schematic illustration of a SHA-256 hash engine 10 in accordance with embodiments of the present invention. Engine 10 includes an input module 50, a process module 52, memory 54, a clock module 56 and an output module 58. As mentioned above, a SHA-256 hash function is used for the signature calculation. In the SHA-256 process, input data block 100 is provided (see more detailed description with reference to Figures 2-5) via input module 50. Input data block 100 may be stored in memory 54. Process module 52 may then perform on input data block 100 a SHA-256 hash logic function, which includes an algorithm of 64 repetitive stages, and which produces a signature. The outcome signature may be outputted via output module 58 and/or stored in memory 54. The SHE-256 hash function is performed by a clocked engine, wherein a stage of hash engine 10 is performed in each clock cycle provided by clock module 56.

[0042] Reference is now made to **Figure 2**, which is a schematic illustration of a state-of-the-art process 20 for signature calculation, also called herein "the regular implementation". As mentioned above, a SHA-256 hash function is used for the signature calculation. In the SHA-256 process, input data block 100 is provided, and by a repetitive algorithm of 64 stages that

are performed based on input data block 100, a signature 263 is produced. The engine is constructed of a state section/pipeline 22 and a data ("W") section/pipeline 24.

[0043] Input data block 100 induces data blocks 101-163, each induced according to a logic algorithm (described in detail with reference to Figure 3) based on the previous data block. Input data block 100 and each of the induced data blocks 101-163 are 512 bits data blocks, each includes 16 words ("W"s 0-15) of 32 bits. The logic of W pipeline 24 generates an induced data block every stage, by generating a new W15 by a function of words W0, W1, W9 and W14 of the previous data block. That is, W15[i+1] = f (W0[i], W1[i], W9[i], W14[i]). The rest of the words of the induced data block are produced by shifting W1-W15 of the previous block to W0-W14 of the induced block, respectively. Accordingly:

W0[i+1] = W1[i]

W1[i+1] = W2[i]

.

.

.

W14[i+1] = W15[i]

[0044] Input data block 100 is provided to W pipeline 24, which feeds state pipeline 22 with W0 of input data block 100. A first state 200 is produced based on W0 of input data block 100. Each of the following states 201-263 is produced in the respective stage based on the previous state and on the first word, i.e. W0, of the respective induced data block of the respective stage. For example, a state [i] is produced in stage [i] based on state [i-1] and on W0[i] of data block [i]. Stage [i] gets W0 from data block [i], and the following stage [i+1] get W0[i+1] from data block [i+1].

[0045] As described in detail herein, embodiments of the present invention enables loading, in each clock cycle, i.e. in each stage, of a new 32 bit word only, rather than copying 16 such words in each cycle. Therefore, the overall power consumption of the Bitcoin mining engine is reduced. Such implementation is called herein "the waterfall implementation", and it may be applied to the W section 24 as well as to the state section 22.

[0046] Figure 3 is a schematic illustration of a logic circuit 30 representing W15[i+1]= W16[i] = f(W0[i], W1[i], W9[i], W14[i]), i.e. the logic function that is implemented in order to create W15 of an induced data block based on W0, W1, W9 and W14 of the previous data block.

[0047] Figure 4 is a schematic illustration of a logic circuit 40 representing the arithmetic logic that is used for calculating the state words A and E of the next state in the state pipeline. The state words A and E of stage i+1 is calculated by manipulation of W0 and words A-H of the previous stage.

[0048] Reference is now made to **Figure 5**, which is a schematic diagram illustrating one job being processed in the data (W) section 24 in a simple W waterfall implementation, herein referred to as a W waterfall, according to some embodiments of the present invention. In the waterfall implementation, instead of creating a data block of 16 words in each stage, the data words may be arranged in succession 60. In the implementation of Figure 5, the words are arranged in one column. On each cycle, a new W is created according to the previous 16 words. As explained in reference to Figure 3, input data block 100 that includes the first 16 words is provided. The first word W0 is sampled by state section 22 for generation of the first state. The seventeenth word W16 is created based on the first, second, tenth and fourteenth words (W0, W1, W9 and W14), for example as described in detail herein above. On the next cycle, W0 becomes irrelevant and data is taken from W1-W16 instead of W0-W15, respectively, to produce the next word (W17) and the corresponding state in the state section. Then, W1 becomes irrelevant and words W2-W17 are used, and so on. This process is called herein a waterfall process. After 16 cycles the waterfall process continues with words W16-W31 and the first 16 words W0-W15 are irrelevant. At this stage, a new data block 100 of 16 words can enter the W waterfall. Therefore, in this implementation, a new job can enter the W waterfall every 16 cycles. Since only one word of 32 bits changes every cycle, power is saved. In this implementation, however, the performance is 1/16 of the performance of a full pipeline engine, since new data can be received once in every 16 cycles.

[0049] Reference is now made to **Figure 6**, which is a schematic illustration of a W waterfall array 300, which allows a new job entry, i.e. new data input, on every cycle, rather than new data every 16 cycles when using one column, according to some embodiments of the present invention. In the W waterfall array implementation, 16 columns 70 of W waterfalls are set in an array format, wherein a new job, i.e. new data input, is entered to another column at each cycle. After sixteen cycles, the first 16 words of the first column are irrelevant, as described in detail above, and a new job can be entered to the first column, taking the place of the first 16 words. In the next cycle, a new job can be entered to the second column, and so on. Accordingly, during every 16 cycles, jobs i to i+15 are entered.

[0050] Accordingly, in the efficient W waterfall array implementation of Figure 6, every column may represent a process where a new job is being entered once in every 16 cycles and occupies the place of words W0-W15 and then for the next 16 cycles the next 16 words are generated and so on. When a job that entered gets to word W63, after 64 cycles, a column maintains four jobs, one in the places of words W0-W15, one in the places of words W16-W31, one in the places of words W32-W47 and one in the places of words W48-W63. In order to provide performance of a new job per cycle instead of job per 16 cycles, 16 columns are used so a new job can be inserted in the place of words W0-W15 of another column in each cycle. When a processed job reaches W63, a signature may be produced and the process of this job ends.

[0051] Reference is now made to **Figure 7**, which is a schematic illustration of an optimized W waterfall array, according to some embodiments of the present invention. In this implementation, the data words are arranged in rows 80 (row[0]-row[63]), such that the words W0 of all the 16 processed jobs are in row 0 and so on, i.e. the sixteen words W[k]s of the 16 jobs are in row [k]. In each cycle, for each row k in the array, if k>15, an input stage is performed in which a new word W is generated for a selected column i, by receiving a W0 multiplexed value from row k-16, a W1 multiplexed value from row k-15, a W9 multiplexed value from row k-7 and a W14 multiplexed value from row k-2, demultiplexing the multiplexed values in order to feed the relevant values for the selected column i and creating a new word W according to the logic described with reference to Figure 3. On each cycle, the subsequent column i in row k is selected until the end of row k is reached after 16 cycles and so forth. Additionally, an output stage is performed in which a multiplexed value is generated by multiplexing the words in row k, to be used as W0, W1, W9 and W14 multiplexed values for generating a new word W in each of rows k+16, k+15, k+7 and k+2. The selection and multiplexing may be controlled by a selection and/or control logic which may be included in process module 52. This structure allows insertion of a new job every cycle, each time to a next column.

[0052] Reference is now made to **Figure 8**, which is a schematic illustration of a simple state waterfall implementation 400 in state section 22, representing one job being processed in state section 22, according to some embodiments of the present invention. The state words A, B, C, D, E, F, G and H are generating words A and E of the next state. Since words B, C and D are generated by shift of A to B, B to C and C to D, they are represented as A[i-3], A[i-2], A[i-1], respectively. Similarly, F[i+1], G[i+2] and H[i+3] are generated from E[i]. A and E are

generated every new cycle based of the relevant data word from the W section and the older A[i-4] and E[i-4] are not relevant anymore. Therefore, a new job can get into a single-column state waterfall every 4 cycles.

[0053] Reference is now made to **Figure 9**, which is a schematic illustration of an exemplary optimized state waterfall array, according to some embodiments of the present invention. In this implementation, the state words are structured in rows. Row 0 includes four couples of A[0] and E[0] state words of respective four jobs, in row [k] there are four couples of the A[k] and E[k] state words. This structure allows a job injection every cycle, each time to the next column in the row. In this implementation, the state words are arranged in rows, such that four couples of A[0] and E[0] state words of the four processed jobs are in row 0 and so on, i.e. four couples of A[k] and E[k] state words of the four processed jobs are in row [k]. In each cycle, for each row k in the array, if k>3, an input stage is performed in which new A and E state word are generated for a selected column i that includes a selected job, by receiving multiplexed values of A-K from rows k-1, k-2, k-3 and k-4, i.e. A[k-1] and E[k-1] (A and E), A[k-2] and E[k-2] (B and F), A[k-3] and E[k-3] (C and G) and A[k-4] and E[k-4] (D and H). The A-F values are demultiplexed in order to feed the relevant values for the selected column i and creating new A and E according to the logic described with reference to Figure 4. On each cycle, the subsequent column i in row k is selected until the end of row k is reached after 4 cycles and so forth. Additionally, an output stage is performed in which a multiplexed value is generated by multiplexing the state words in row k, to be used as A-F multiplexed values for generating new state words A and E in each of rows k+1, k+2, k+3 and k+4. The selection and multiplexing may be controlled by a selection and/or control logic which may be included in process module 52. This structure allows insertion of a new job every cycle, each time to a next column.

[0054] Reference is now made to **Figure 10**, which is a schematic illustration of the waterfall implementations in the data (W) and state sections, according to some embodiments of the present invention. As shown in Figure 10, the waterfall implementations enable a large amount of jobs to be processed concurrently, wherein each job "falls" towards the 64th stage in each cycle, thus allowing a new job to enter, to another column on each cycle.

[0055] Reference is now made to **Figure 11**, which is a schematic flowchart illustrating a method 600 for hash calculation according to some embodiments of the present invention. As indicated in block 510, the method may include receiving an input data block to a data pipeline, the data block may include a sequence of data words including X data words,

wherein X is a known number. For example, the input data block may include 16 words of 32 bits each. As indicated in block 520, the method may include calculating, in every clock cycle of the clock module, a new data word based on the last calculated X data words. As indicated in block 530, the method may include performing a stage of the state pipeline in each clock cycle of the clock module, in which a state is calculated based on input from the data pipeline, the input includes the last calculated X data words. As indicated in block 540, the method may include outputting the hash via an output module every predetermined number of clock cycles.

[0056] In some embodiments of the present invention, the calculated state includes a sequence of eight state words, wherein the method further comprises calculating, in each clock cycle, a first and fifth new state words of the sequence, in order to form a new state of sequenced eight words based of the previous state's words

[0057] In some embodiments of the present invention, the method may further include inserting, after X clock cycles, a new input data block instead of the first X data words of the previously inserted input data block.

[0058] In some embodiments of the present invention, the engine has an array arrangement, the array has X columns to which input data blocks can be inserted, wherein the method further comprises receiving a new input data blocks to another of the X columns on every clock cycle, once the first X data words in the column become irrelevant. Each column may include up to four different input data blocks in process.

[0059] In some embodiments of the present invention, the method may further include providing to a row in said array arrangement, in each clock cycle, multiplexed values from previous rows, demultiplexing the multiplexed values in order to create a new data word in a selected column, and generating multiplexed word values by multiplexing data words of the row, for generating new words in following rows.

[0060] In some embodiments of the present invention, the engine has an array arrangement in the state pipeline, the array has four columns, to which state sequences can be inserted, each state sequence is represented by four couples of a first and a fifth words, wherein the method further comprises receiving a new state sequence to another of the four columns on every clock cycle, once the first four couples in the column become irrelevant.

[0061] In some embodiments of the present invention, the method may further include providing to a row in said array arrangement, in each clock cycle, multiplexed values from previous rows, demultiplexing the multiplexed values in order to create a new state word in a selected column, and generating multiplexed word values by multiplexing state words of the row, for generating new words in following rows.

[0062] Although various features of the invention may be described in the context of a single embodiment, the features may also be provided separately or in any suitable combination. Conversely, although the invention may be described herein in the context of separate embodiments for clarity, the invention may also be implemented in a single embodiment.

[0063] Reference in the specification to "some embodiments", "an embodiment", "one embodiment" or "other embodiments" means that a particular feature, structure, or characteristic described in connection with the embodiments is included in at least some embodiments, but not necessarily all embodiments, of the inventions.

[0064] It is to be understood that the phraseology and terminology employed herein is not to be construed as limiting and are for descriptive purpose only.

[0065] The principles and uses of the teachings of the present invention may be better understood with reference to the accompanying description, figures and examples.

[0066] It is to be understood that the details set forth herein do not construe a limitation to an application of the invention.

[0067] Furthermore, it is to be understood that the invention can be carried out or practiced in various ways and that the invention can be implemented in embodiments other than the ones outlined in the description above.

[0068] It is to be understood that the terms “including”, “comprising”, “consisting” and grammatical variants thereof do not preclude the addition of one or more components, features, steps, or integers or groups thereof and that the terms are to be construed as specifying components, features, steps or integers.

[0069] If the specification or claims refer to "an additional" element, that does not preclude there being more than one of the additional element.

[0070] It is to be understood that where the claims or specification refer to "a" or "an" element, such reference is not be construed that there is only one of that element.

[0071] It is to be understood that where the specification states that a component, feature, structure, or characteristic "may", "might", "can" or "could" be included, that particular component, feature, structure, or characteristic is not required to be included.

[0072] The descriptions, examples, methods and materials presented in the claims and the specification are not to be construed as limiting but rather as illustrative only.

[0073] Meanings of technical and scientific terms used herein are to be commonly understood as by one of ordinary skill in the art to which the invention belongs, unless otherwise defined.

[0074] The present invention may be implemented in the testing or practice with methods and materials equivalent or similar to those described herein.

[0075] While the invention has been described with respect to a limited number of embodiments, these should not be construed as limitations on the scope of the invention, but rather as exemplifications of some of the preferred embodiments. Other possible variations, modifications, and applications are also within the scope of the invention.

What is claimed is:

1. A hash engine comprising:

an input module for receiving data blocks;

a memory;

a clock module to provide clock cycles;

a process module including a data pipeline and a state pipeline for calculating a hash from a received data block, the process module is configured to:

receive an input data block to the data pipeline, the data block includes a sequence of data words including X data words, wherein X is a known number;

calculate, in every clock cycle of the clock module, a new data word based on the last calculated X data words; and

perform a stage of the state pipeline in each clock cycle of the clock module, in which a state is calculated based on input from the data pipeline, the input includes the last calculated X data words;

and

an output module to output the hash every predetermined number of clock cycles.

2. The engine of claim 1, wherein X is equal 16, and wherein each data word is of 32 bits.

3. The engine of claim 1, wherein the calculated state includes a sequence of eight state words, wherein the process module is further configured to calculate, in each clock cycle, a first and fifth new state words of the sequence, in order to form a new state of sequenced eight words based of the previous state's words.

4. The engine of claim 1, wherein after X clock cycles, a new input data block is inserted instead of the first X data words of the previously inserted input data block.

5. The engine of claim 1, wherein the engine has an array arrangement, the array has X columns to which input data blocks can be inserted, wherein the engine is configured

to receive a new input data blocks to another of the X columns on every clock cycle, once the first X data words in the column become irrelevant.

6. The engine of claim 5, wherein each column may include up to four different input data blocks in process.

7. The engine of claim 5, further configured to provide to a row in said array arrangement, in each clock cycle, multiplexed values from previous rows, to demultiplex the multiplexed values in order to create a new data word in a selected column, and to generate multiplexed word values by multiplexing data words of the row, for generating new words in following rows.

8. The engine of claim 3, wherein the engine has an array arrangement in the state pipeline, the array has four columns, to which state sequences can be inserted, each state sequence is represented by four couples of a first and a fifth words, wherein the engine is further configured to receive a new state sequence to another of the four columns on every clock cycle, once the first four couples in the column become irrelevant.

9. The engine of claim 8, further configured to provide to a row in said array arrangement, in each clock cycle, multiplexed values from previous rows, to demultiplex the multiplexed values in order to create a new state word in a selected column, and to generate multiplexed word values by multiplexing state words of the row, for generating new words in following rows.

10. A method for hash calculation, the method comprising:

receiving data blocks via an input module;

providing clock cycles by a clock module;

calculating a hash from a received data block by a process module including a data pipeline and a state pipeline, the hash calculation comprising:

receiving an input data block to the data pipeline, the data block includes a sequence of data words including X data words, wherein X is a known number;

calculating, in every clock cycle of the clock module, a new data word based on the last calculated X data words; and

performing a stage of the state pipeline in each clock cycle of the clock module, in which a state is calculated based on input from the data pipeline, the input includes the last calculated X data words;

and

outputting the hash via an output module every predetermined number of clock cycles.

11. The method of claim 10, wherein X is equal 16, and wherein each data word is of 32 bits.

12. The method of claim 10, wherein the calculated state includes a sequence of eight state words, wherein the method further comprises calculating, in each clock cycle, a first and fifth new state words of the sequence, in order to form a new state of sequenced eight words based of the previous state's words.

13. The method of claim 10, further comprising inserting, after X clock cycles, a new input data block instead of the first X data words of the previously inserted input data block.

14. The method of claim 10, wherein the engine has an array arrangement, the array has X columns to which input data blocks can be inserted, wherein the method further comprises receiving a new input data blocks to another of the X columns on every clock cycle, once the first X data words in the column become irrelevant.

15. The method of claim 14, wherein each column may include up to four different input data blocks in process.

16. The method of claim 14, further comprising providing to a row in said array arrangement, in each clock cycle, multiplexed values from previous rows, demultiplexing the multiplexed values in order to create a new data word in a selected column, and generating multiplexed word values by multiplexing data words of the row, for generating new words in following rows.

17. The method of claim 12, wherein the engine has an array arrangement in the state pipeline, the array has four columns, to which state sequences can be inserted, each state sequence is represented by four couples of a first and a fifth words, wherein the method further comprises receiving a new state sequence to another of the four columns on every clock cycle, once the first four couples in the column become irrelevant.

18. The method of claim 17, further comprising providing to a row in said array arrangement, in each clock cycle, multiplexed values from previous rows, demultiplexing the multiplexed values in order to create a new state word in a selected column, and generating multiplexed word values by multiplexing state words of the row, for generating new words in following rows.

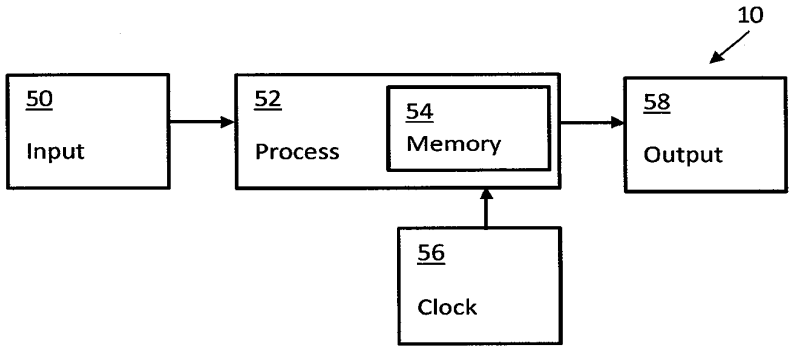


Figure 1

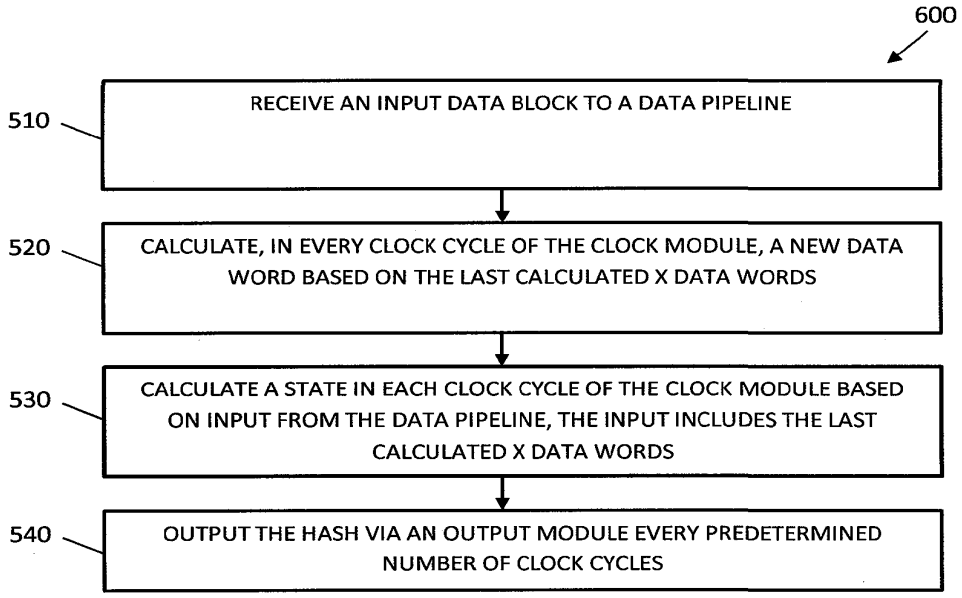


Figure 11

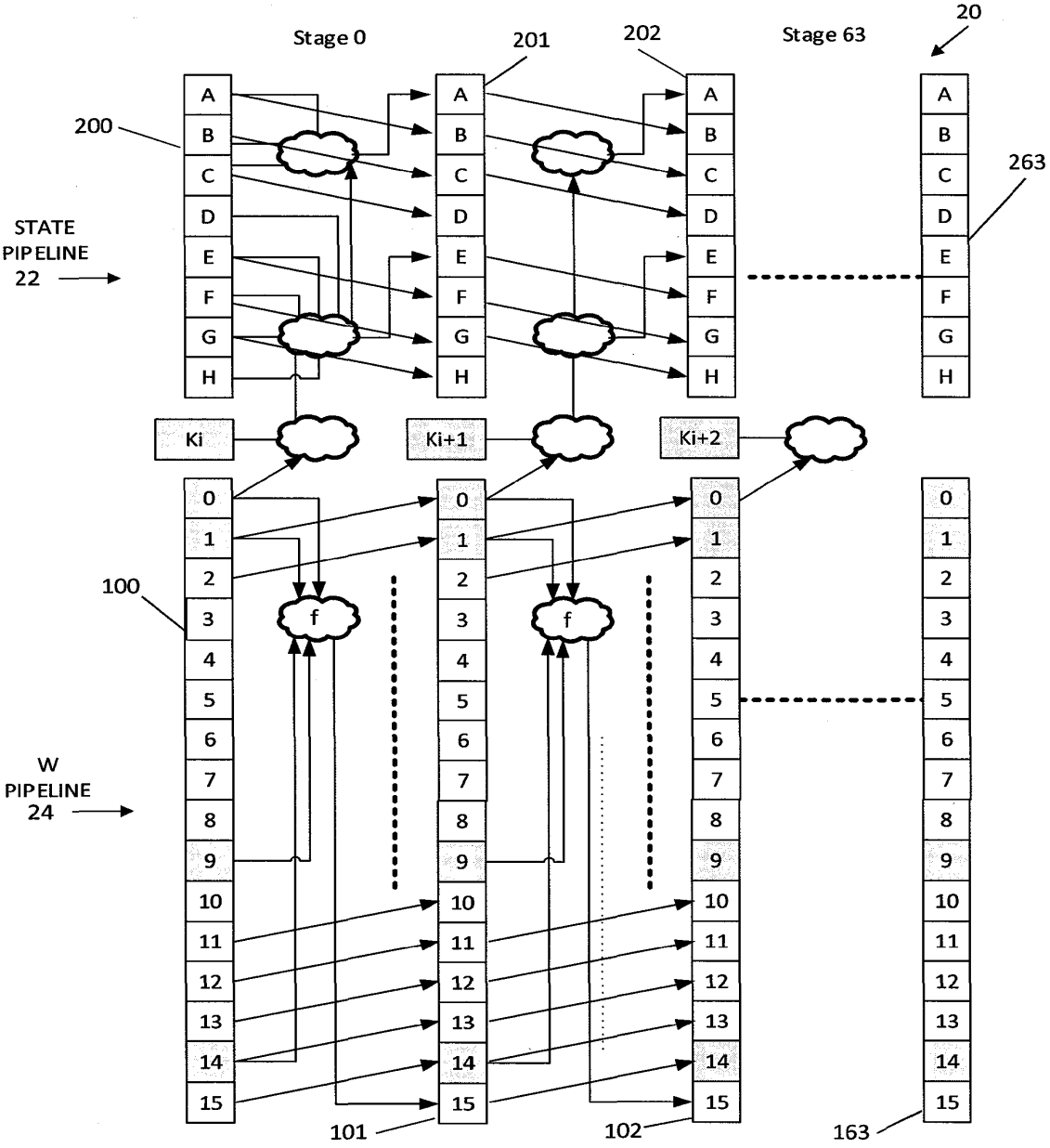


Figure 2
Prior Art

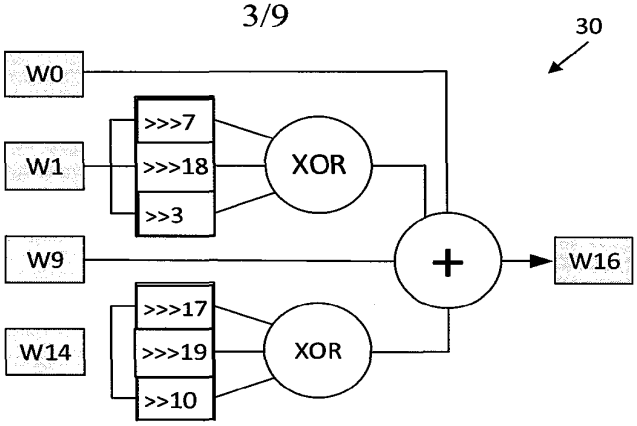


Figure 3

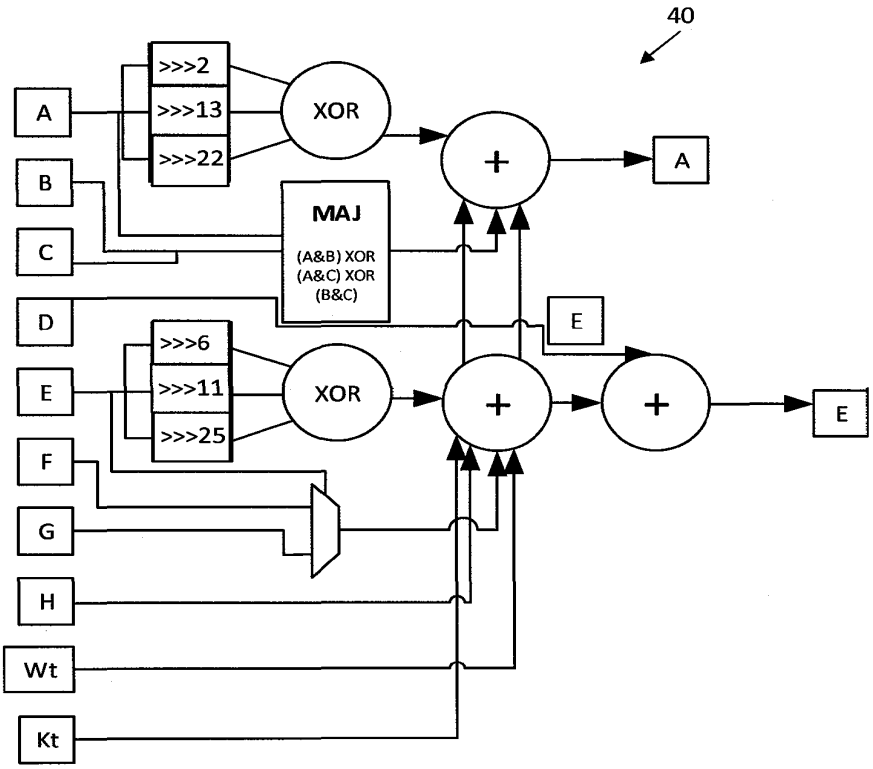


Figure 4

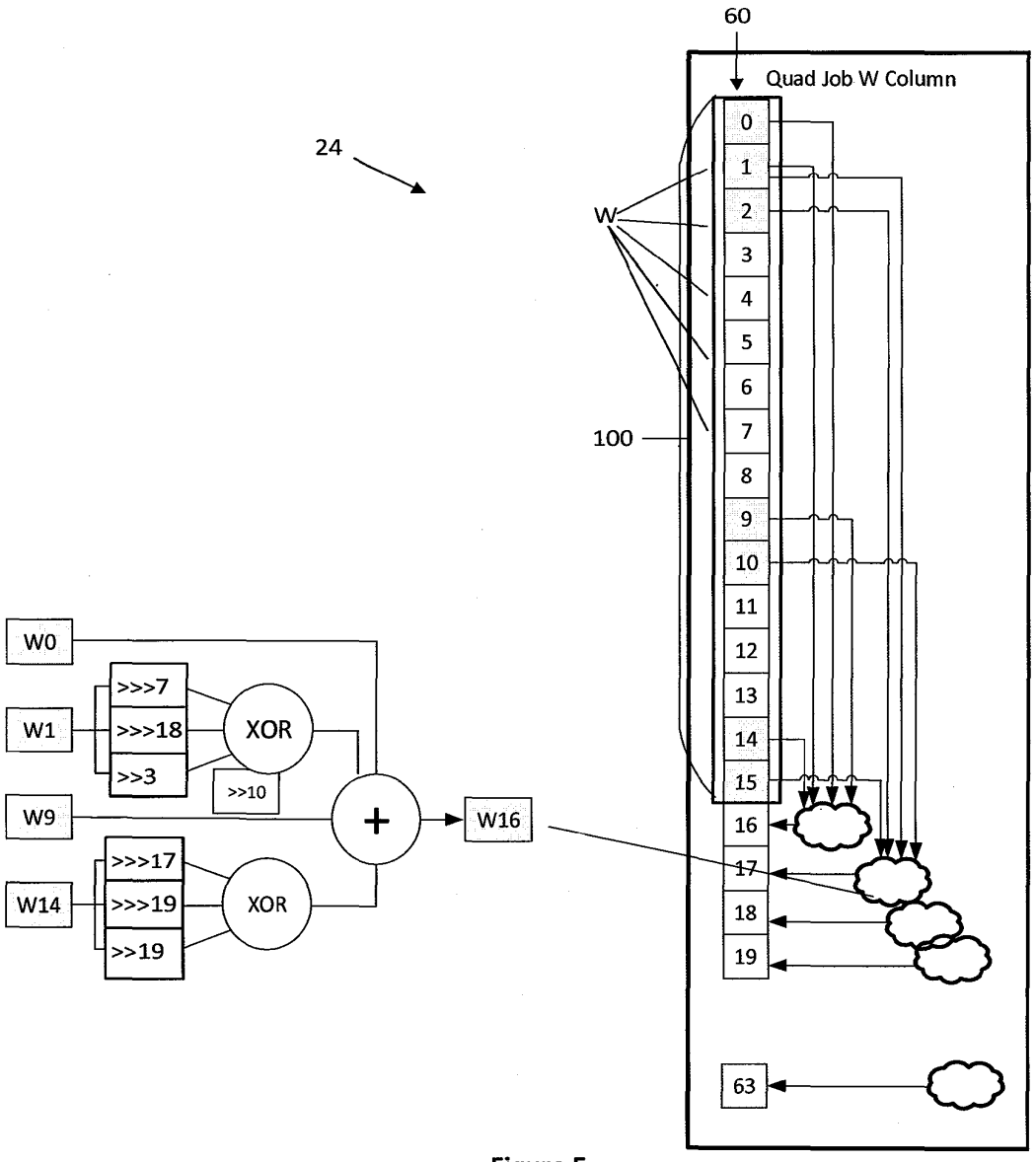

60
Quad Job W Column
24
W
100
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
63
W0
W1
W9
W14
>>>7
>>>18
>>3
XOR
>>10
+
W16
>>>17
>>>19
>>19
XOR

Figure 5

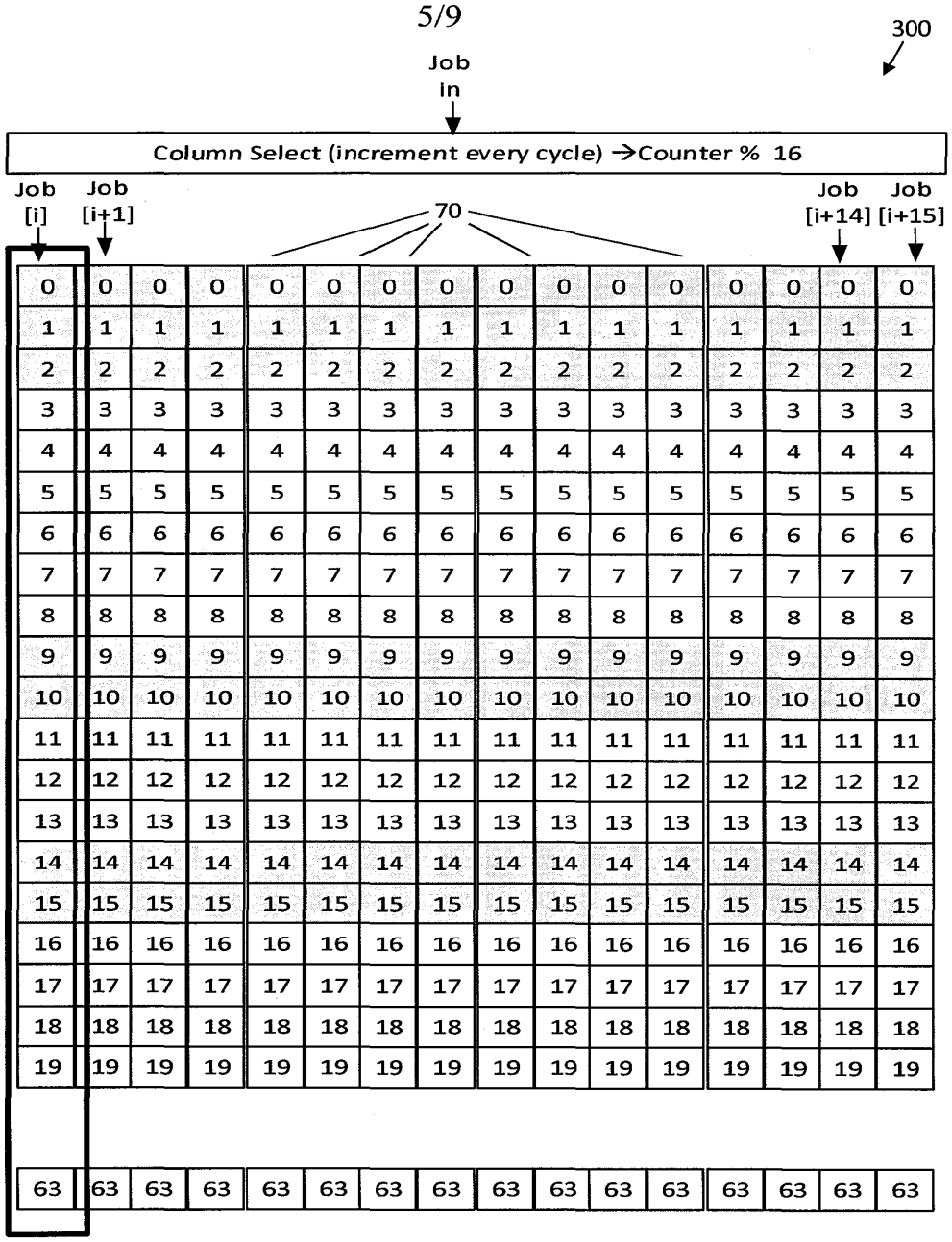

300
Job in
Column Select (increment every cycle) →Counter % 16
Job [i]
Job [i+1]
70
Job [i+14]
Job [i+15]

Figure 6

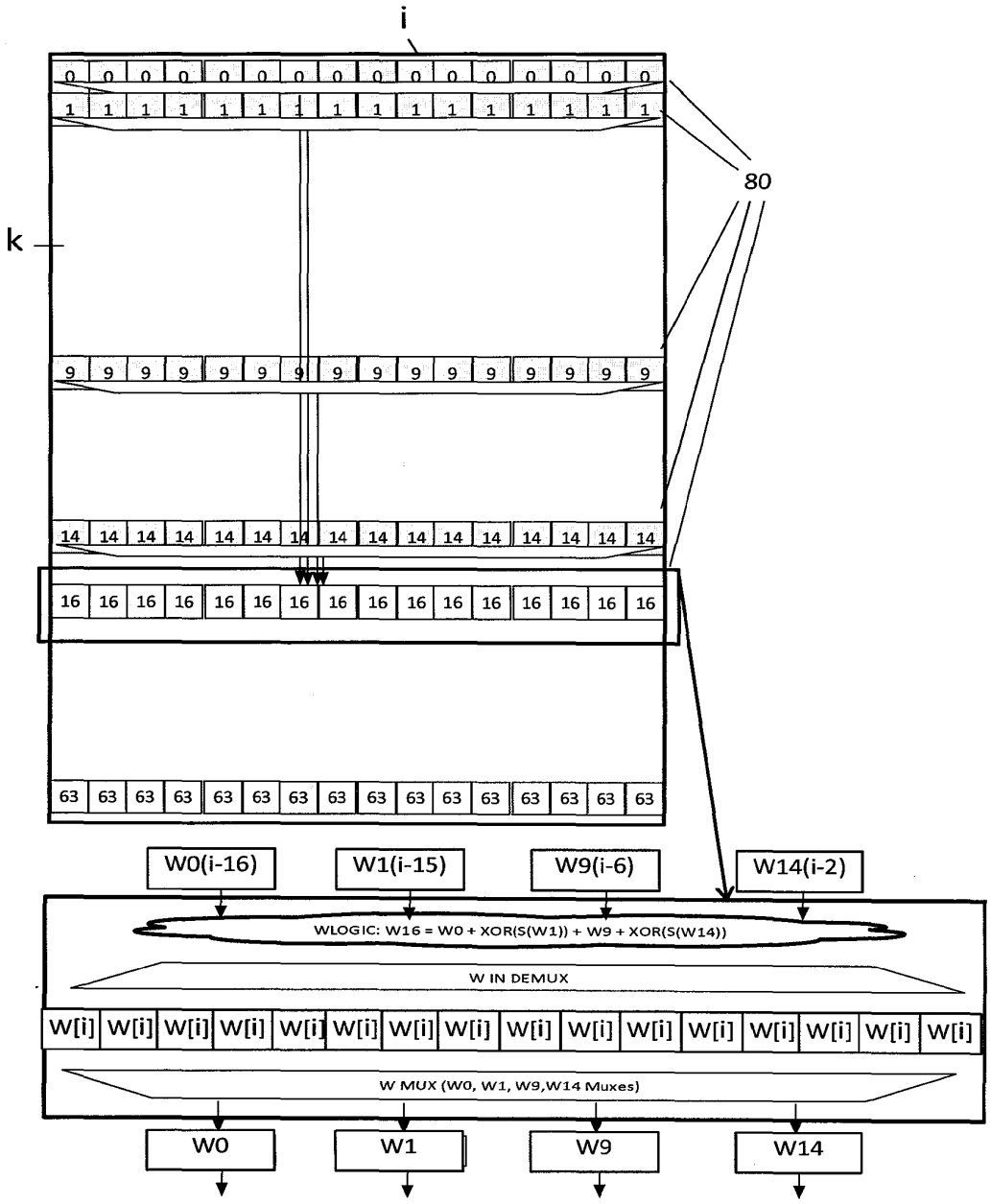

i
k
80
W0(i-16)
W1(i-15)
W9(i-6)
W14(i-2)
WLOGIC: W16 = W0 + XOR(S(W1)) + W9 + XOR(S(W14))
W IN DEMUX
W MUX (W0, W1, W9,W14 Muxes)
W0
W1
W9
W14

Figure 7

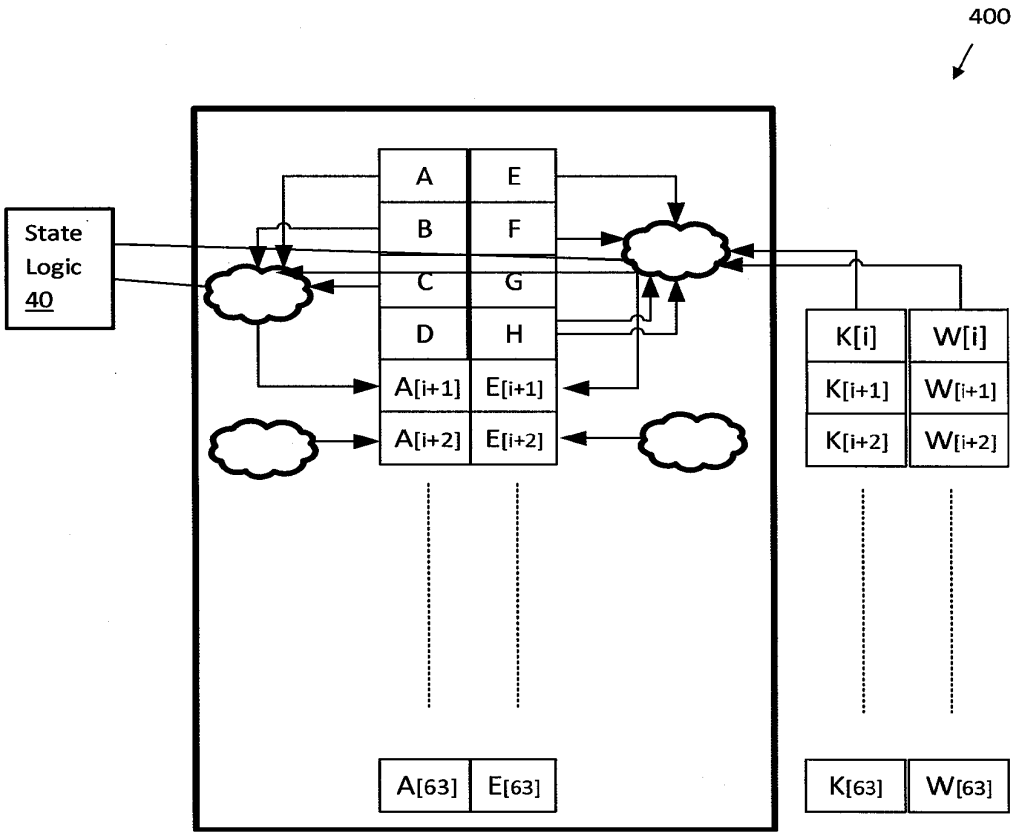

400
State Logic 40
A
E
B
F
C
G
D
H
A[i+1]
E[i+1]
A[i+2]
E[i+2]
A[63]
E[63]
K[i]
W[i]
K[i+1]
W[i+1]
K[i+2]
W[i+2]
K[63]
W[63]

Figure 8

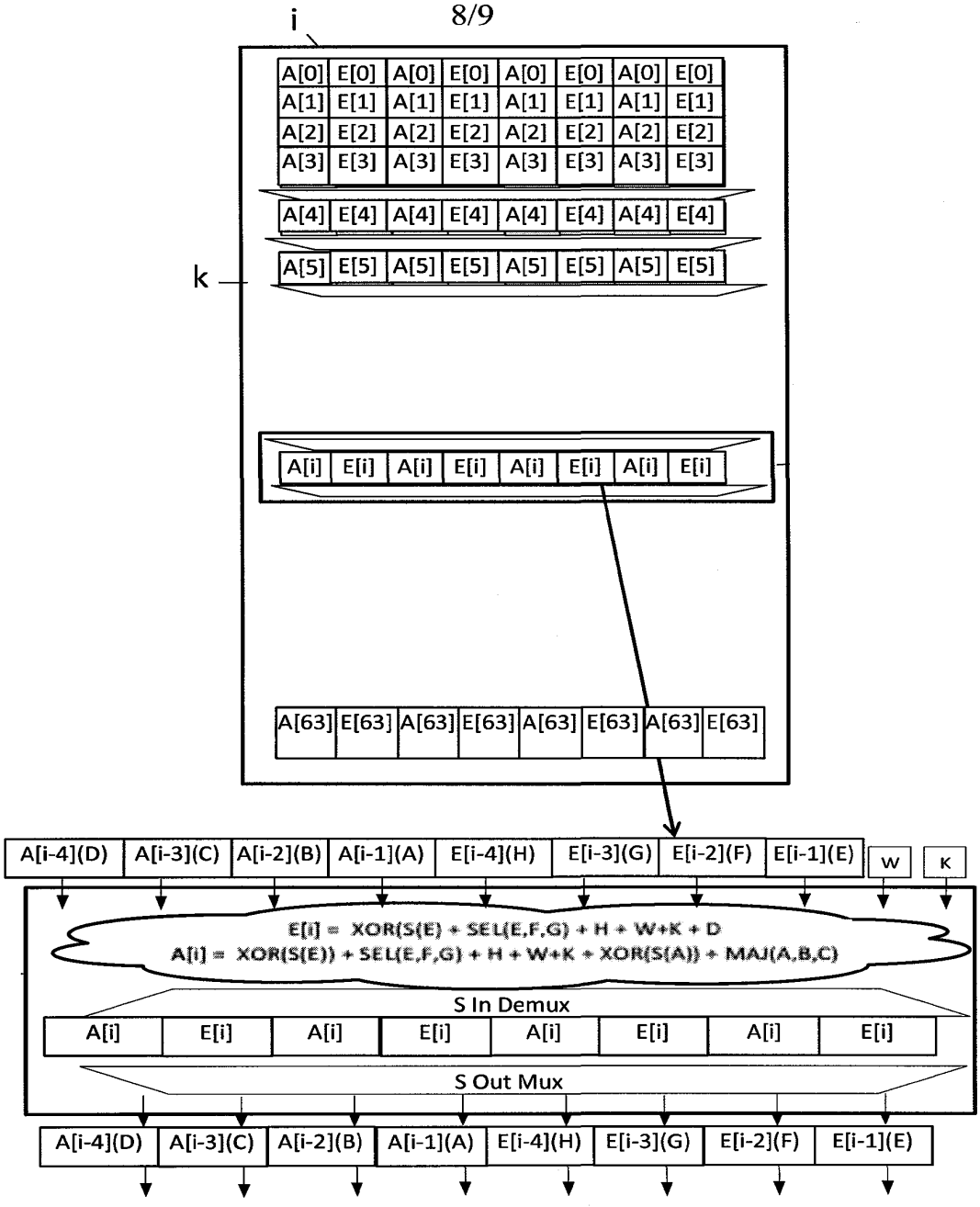

i
A[0] E[0] A[0] E[0] A[0] E[0] A[0] E[0]
A[1] E[1] A[1] E[1] A[1] E[1] A[1] E[1]
A[2] E[2] A[2] E[2] A[2] E[2] A[2] E[2]
A[3] E[3] A[3] E[3] A[3] E[3] A[3] E[3]
A[4] E[4] A[4] E[4] A[4] E[4] A[4] E[4]
k
A[5] E[5] A[5] E[5] A[5] E[5] A[5] E[5]
A[i] E[i] A[i] E[i] A[i] E[i] A[i] E[i]
A[63] E[63] A[63] E[63] A[63] E[63] A[63] E[63]
A[i-4](D) A[i-3](C) A[i-2](B) A[i-1](A) E[i-4](H) E[i-3](G) E[i-2](F) E[i-1](E)
W
K
E[i] = XOR(S(E) + SEL(E,F,G) + H + W+K + D
A[i] = XOR(S(E)) + SEL(E,F,G) + H + W+K + XOR(S(A)) + MAJ(A,B,C)
S In Demux
A[i] E[i] A[i] E[i] A[i] E[i] A[i] E[i]
S Out Mux
A[i-4](D) A[i-3](C) A[i-2](B) A[i-1](A) E[i-4](H) E[i-3](G) E[i-2](F) E[i-1](E)

Figure 9

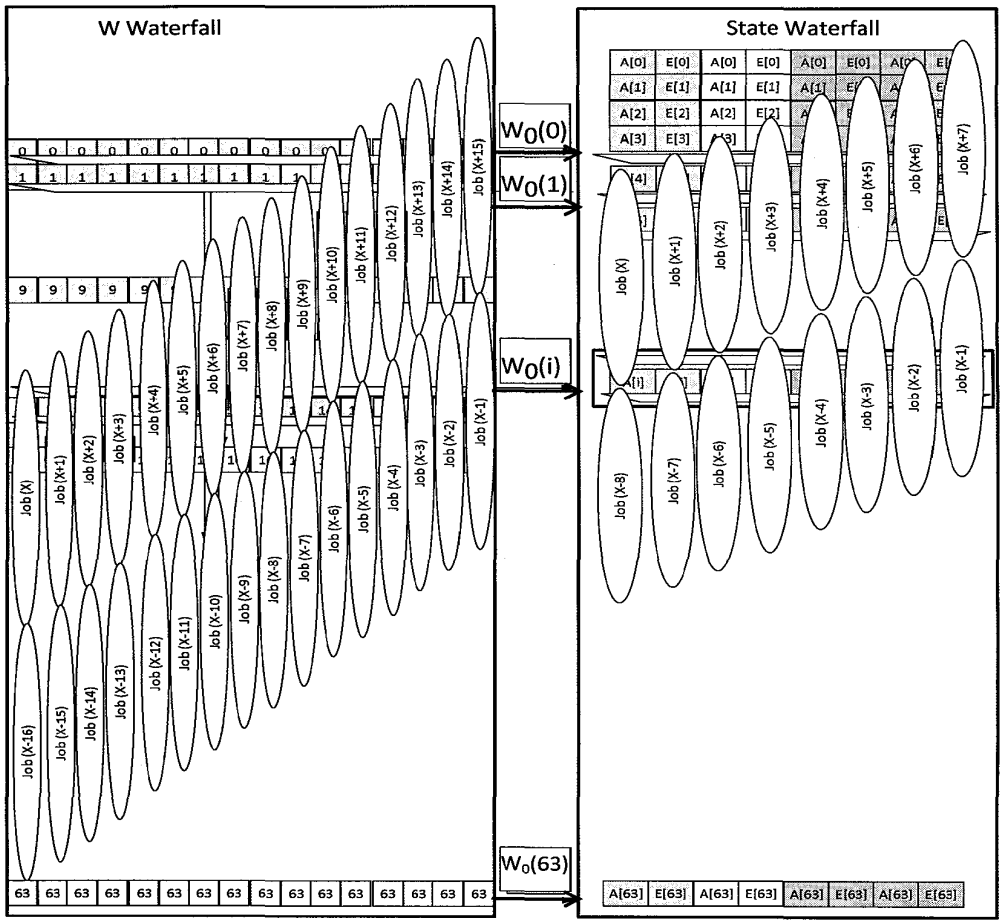


Figure 10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL2015/051060

A. CLASSIFICATION OF SUBJECT MATTER

IPC (2016.01) G06F 9/38, G06F 17/10, H04L 9/28, G06Q 20/06, G06Q 20/36, G06Q 20/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC (2016.01) G06F 9/38, G06F 17/10, G06Q 20/06, G06Q 20/36, G06Q 20/38, H04L 9/28

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Databases consulted: Esp@cenet, Google Patents, Google Scholar

Search terms used: hash calculation pipeline waterfall power consumption clock cycle state stage parallel

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 7684563 B1 OLSON et al. 23 Mar 2010 (2010/03/23) The whole document	1,2,10,11
A	The whole document	3-9,12-18

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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

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

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 Feb 2016	15 Feb 2016

Name and mailing address of the ISA:	Authorized officer
Israel Patent Office Technology Park, Bldg.5, Malcha, Jerusalem, 9695101, Israel Facsimile No. 972-2-5651616	PLACHINTA Ekaterina Telephone No. 972-2-5651740

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IL2015/051060

Patent document cited search report	Publication date	Patent family member(s)	Publication Date
US 7684563 B1	23 Mar 2010	US 7684563 B1	23 Mar 2010

Form PCT/ISA/210 (patent family annex) (January 2015)

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/484,728	01/06/2020	Stephen Barbour	91A-3US	1944

130443 7590 04/19/2022

Nissen Patent Law
#200, 10328- 81 Ave
Edmonton, ALBERTA T6E1X2
CANADA

EXAMINER	
REAGAN, JAMES A	

ART UNIT	PAPER NUMBER
3688	

MAIL DATE	DELIVERY MODE
04/19/2022	PAPER

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.

Office Action Summary	Application No. 16/484,728	Applicant(s) Barbour, Stephen	
	Examiner JAMES A REAGAN	Art Unit 3688	AIA (FITF) Status Yes

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

Period for Reply

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

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

Status

1)☑ Responsive to communication(s) filed on 01/06/2020.

☐ 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) 1-41 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) 1-26 and 28-41 is/are rejected.

8) ☑ Claim(s) 27 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 _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☑ All b)☐ Some** c)☐ None of the:

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

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

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

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

Attachment(s)

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

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

3) ☑ Interview Summary (PTO-413) Paper No(s)/Mail Date 1.

4) ☐ Other: _____.

Continuation of Attachment(s) 2) Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date: 02/07/2020, 05/13/2021, 08/09/2021, and 04/15/2022

DETAILED ACTION

Acknowledgments

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

This action is in reply to the application filed on **01/06/2020**.

Claims 1-41 are currently pending and have been examined.

Allowable Subject Matter

Claim 27 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Information Disclosure Statement

The Information Disclosure Statements filed **02/07/2020, 05/13/2021, 08/09/2021,** and **04/15/2022** have been considered. Initialed copies of the Form 1449 are enclosed herewith.

Claim Interpretation

After careful review of the original specification, the Examiner is unable to locate any lexicographic definitions with the required clarity, deliberateness, and precision. See MPEP §2111.01 IV.

Terms such as "when", "if", "only if", "on the condition", "in the event" and "in a case where" are representative of optional limitations; therefore, optional or conditional language do not narrow the claims because they can always be omitted.

35 U.S.C. 112(b) or pre-AIA 35 U.S.C. 112, 2nd Paragraph, Failure To Particularly Point out and Distinctly Claim (Indefinite)

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.

Claim 24 is rejected under 35 U.S.C. 112(b) or pre-AIA 35 U.S.C. 112, 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. The claim appears to be written as a "use claim." See MPEP 2173.05(q).

Claims 1, 3, 7, 9, 13, 14, 18, 20, 21, 24-29, 35, and 40 are rejected under 35 U.S.C. 112(b) or pre-AIA 35 U.S.C. 112, 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. The Examiner cannot determine the metes and bounds of the claim because the claim has been written in the alternative using an "or" statement. For the purposes of this examination, the Examiner will assume that the claim is a properly written Markush-type limitation: …one of the group consisting of [A, B, *and* C].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102 of this title, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention 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 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 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 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-3, 8, 10-18, 24-26, 28, 29, 34-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belady et al. (USPGP 2014/0096837 A1), hereinafter **BELADY**, in view of Gleichauf (USPGP 2018/0109541 A1), hereinafter **GLEIFCHAUF**.

Claims 1 and 24:

BELADY as shown below discloses the following limitations:

- *a source of combustible gas produced from an oil production, storage, or processing facility;* (see at least Figure 1 as well as associated and related text; paragraphs 0004, 0028)
- *a generator connected to the source of combustible gas;* (see at least Figure 1 as well as associated and related text; paragraphs 0004, 0028)
- *a blockchain mining device connected to the generator.* (see at least paragraph 0002)

BELADY discloses a server but does not specifically disclose *a blockchain mining device*. However, **GLEIFCHAUF**, in at least paragraphs 0018 and 0051 discloses using servers for blockchain mining and verification. In the competitive business climate, there is a profit-driven motive to maximize the profitability of goods and services that are provided or marketed to customers. Enterprises typically use business planning to make decisions in order to maximize profits. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine/modify the method of **BELADY** with the technique of **GLEIFCHAUF** because, "...data centers often consume large quantities of electrical power, especially by the computing devices themselves. Increasingly, the cost of obtaining such electrical power is becoming a primary determinant in the economic success of a data center. Consequently, data centers are being located in areas where the data centers can obtain electrical power in a cost-effective manner. In some instances, data centers are being located in areas that can provide inexpensive electrical power directly, such as areas in which electricity can be purchased from electrical utilities or governmental electrical facilities inexpensively. In other instances, however, data centers are being located in areas where natural resources, from which electrical power can be derived, are abundant and can be obtained inexpensively. For example, natural gas is a byproduct of oil drilling operations and is often considered a waste byproduct since it cannot be economically captured and brought to market. Consequently, in areas where oil drilling operations are being conducted, natural gas is often available for free, or at a minimal

cost. As will be recognized by those skilled in the art, natural gas can be utilized to generate electrical power, such as, for example, through a fuel cell or by generating steam to drive a steam powered electrical generator. As another example, municipal landfills and other like waste treatment and processing centers can produce a gas commonly referred to as "biogas" which can, likewise, be utilized to generate electrical power that can, then, be consumed by the computing devices of a data center. Unfortunately, gas that is available at reduced cost cannot always be provided at a well-maintained pressure. Instead, the pressure at which such gases are provided can often vary substantially, including both positive and negative gas pressure spikes where the pressure of the provided gas increases, or decreases, respectively. Not only can such gas pressure spikes damage equipment that utilizes such gas, but they can also be disruptive to the entire gas supply network." (**BELADY**: paragraph 0004). Moreover, each of the elements claimed are all shown by the prior art of record but not combined as claimed. However, the technical ability exists to combine the elements as claimed and the results of the combination are predictable. Therefore, when combined, the elements perform the same function as they did separately. (*KSR v. Teleflex*, 127 S. Ct. 1727 (2007)). Additionally, there is a recognized problem or need in the art including market pressure, design need, etc., and there are a finite number of identified predictable solutions. Consequently, those in the art could have pursued known solutions with reasonable expectation of success. (*KSR v. Teleflex*, 127 S. Ct. 1727 (2007)).

Claims 2 and 28:

The combination of **BELADY**/**GLEIFCHAUF** discloses the limitations as shown in the rejections above. **BELADY** further discloses:

- *isolated from a sales gas line and an external electrical power grid.*
- *the hydrocarbon production well, storage, or processing facility comprises an oil or gas well that is isolated from a sales gas line and an external electrical power grid.*

See at least Figure 1 as well as associated and related text, and paragraphs 0004 and 0028.

Claims 3 and 29:

The combination of **BELADY**/**GLEIFCHAUF** discloses the limitations as shown in the rejections above.

BELADY further discloses*:*

- *the oil production, storage, or processing facility comprises a remote oil well;*
- *the source of combustible gas comprises the remote oil well;*
- *the remote oil well is connected to produce a continuous flow of combustible gas to power the generator.*

See at least Figure 1 as well as associated and related text, and paragraphs 0004 and 0028.

Claim 8:

The combination of **BELADY**/**GLEIFCHAUF** discloses the limitations as shown in the rejections above.

BELADY further discloses *the generator and blockchain mining device are located adjacent to the oil production, storage, or processing facility.* See at least Figure 1 as well as associated and related text, and paragraphs 0004 and 0028.

Claims 10, 11, and 34:

The combination of **BELADY**/**GLEIFCHAUF** discloses the limitations as shown in the rejections above.

GLEIFCHAUF further discloses*:*

- *the blockchain mining device has a network interface and a mining processor;*
- *the network interface is connected to receive and transmit data through the internet to a network that stores or has access to a blockchain database;*
- *the mining processor is connected to the network interface and adapted to mine transactions associated with the blockchain database and to communicate with the blockchain database.*
- *the network is a peer to peer network;*
- *the blockchain database is a distributed database stored on plural nodes in the peer to peer network;*
- *the blockchain database stores transactional information for a digital currency.*
- *operating the blockchain mining device to:*
- *mine transactions with the blockchain mining device;*

- *communicate wirelessly through the internet to communicate with a blockchain database.*

See at least paragraphs 0002-0005, 0014, 0016, 0018, 0021, and 0024. In the competitive business climate, there is a profit-driven motive to maximize the profitability of goods and services that are provided or marketed to customers. Enterprises typically use business planning to make decisions in order to maximize profits. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine/modify the method of **BELADY** with the technique of **GLEIFCHAUF** because there is a recognized problem or need in the art including market pressure, design need, etc., and there are a finite number of identified predictable solutions. Consequently, those in the art could have pursued known solutions with reasonable expectation of success. (*KSR v. Teleflex*, 127 S. Ct. 1727 (2007)).

Claims 12, 13, 35, and 36:

The combination of **BELADY**/**GLEIFCHAUF** discloses the limitations as shown in the rejections above. **GLEIFCHAUF** further discloses:

- *a controller is connected to modulate a power load level exerted by the blockchain mining device on the generator, by increasing or decreasing the mining activity of the mining processor.*
- *the mining processor comprises a plurality of mining processors;*
- *the controller is connected to modulate the maximum power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining transactions.*
- *the blockchain mining device comprises a plurality of mining processors;*
- *modulating comprises modulating the power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining transactions.*

See at least paragraphs 0027 and 0029. In the competitive business climate, there is a profit-driven motive to maximize the profitability of goods and services that are provided or marketed to customers. Enterprises typically use business planning to make decisions in order to maximize profits. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine/modify the method of **BELADY** with the technique of **GLEIFCHAUF** because there is a recognized problem or need in the art including market pressure, design need, etc., and there are a finite number of identified predictable

solutions. Consequently, those in the art could have pursued known solutions with reasonable expectation of success. (*KSR v. Teleflex*, 127 S. Ct. 1727 (2007)).

Claim 14:

The combination of **BELADY/GLEIFCHAUF** discloses the limitations as shown in the rejections above.

BELADY further discloses:

- *the oil production, storage, or processing facility comprises a remote oil well;*
- *the source of combustible gas comprises the remote oil well, which is connected to produce a continuous flow of combustible gas to operate the generator.*

See at least Figure 1 as well as associated and related text, and paragraphs 0004 and 0028.

Claims 15, 16, 37, 38, and 41:

The combination of **BELADY/GLEIFCHAUF** discloses the limitations as shown in the rejections above.

BELADY further discloses:

- *the controller is connected to modulate the power load level in response to variations in a production rate of combustible gas from the remote oil well.*
- *a production rate of combustible gas from the remote oil well varies between a daily minimum production rate and a daily maximum production rate;*
- *while the production rate is above the daily minimum production rate, the controller is set to limit the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate.*
- *the power load level is limited to above a power level produced by the generator when the production rate is at the daily maximum production rate.*

See at least paragraph 0015.

Claims 17, 18, and 40:

The combination of **BELADY**/**GLEIFCHAUF** discloses the limitations as shown in the rejections above.

BELADY further discloses:

- *the controller is set to divert to a load bank excess electricity produced by the generator.*
- *a production rate of combustible gas from the remote oil well varies between a daily minimum production rate and a daily maximum production rate;*
- *the controller is set to limit the power load level to above a power level producible by the generator when the production rate is at the daily minimum production rate;*
- *a backup source, of fuel or electricity, is connected make up a shortfall in fuel or electricity, respectively, required to supply the blockchain mining device with the power load level.*

See at least Figure 2 as well as associated and related text, and paragraphs 0002, 0005, 0015, .

Claims 25 and 26:

The combination of **BELADY**/**GLEIFCHAUF** discloses the limitations as shown in the rejections above.

BELADY further discloses:

- *prior to using the source of combustible gas:*
- *disconnecting the source of combustible gas from a combustible gas disposal device at the hydrocarbon production well, storage, or processing facility;*
- *connecting the source of combustible gas to operate the blockchain mining device.*
- *connecting the source of combustible gas to operate the blockchain mining device;*
- *diverting gas from a combustible gas disposal or storage device to operate the blockchain mining device.*

See at least Figure 1 as well as associated and related text, and paragraphs 0004 and 0028.

Claims 4-7, 9, 19-23, 30-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over **BELADY/GLEIFCHAUF** and further in view of Examiner's **OFFICIAL NOTICE**.

Claims 4-7, 9, 30, 31, 33:

The combination of **BELADY/GLEIFCHAUF** discloses the limitations as shown in the rejections above. **BELADY/GLEIFCHAUF** does not specifically disclose:

- *a combustion engine connected to the source of combustible gas and connected to drive the generator.*
- *the combustion engine is a prime mover that is connected to produce oil from the remote oil well.*
- *the combustion engine is a first combustion engine, and further comprising a second combustion engine that is a prime mover that is connected to produce oil from the remote oil well.*
- *the oil production, storage, or processing facility comprise an oil storage or processing unit;*
- *the source of combustible gas comprises the oil storage or processing unit, which has a gas outlet connected to supply combustible gas to operate the generator;*
- *the oil storage or processing unit is connected to receive oil produced from a remote oil well.*
- *oil production, storage, or processing facility comprises a remote oil well, which comprises a plurality of remote oil wells, and one or both of the following conditions are satisfied:*
- *the plurality of remote oil wells are located on a multi-well pad;*
- *the plurality of remote oil wells include a satellite well.*
- *the combustion engine is a first combustion engine, and further comprising:*
- *prior to supplying combustible gas to the first combustion engine, connecting the first combustion engine to receive combustible gas from the remote oil well;*
- *using a second combustion engine as a prime mover to produce oil from the remote oil well.*

However, the Examiner takes **OFFICIAL NOTICE** that it is old and well known in the oil drilling and exploration arts to utilize common and basic machinery and structural layouts during the process of oil production. In the competitive business climate, there is a profit-driven motive to maximize the profitability of goods and services that are provided or marketed to customers. Enterprises typically use business planning to make decisions in order to maximize profits. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine/modify the method of **BELADY/GLEIFCHAUF**

with the technique of utilizing a combustion engines and generators and logical design plans because there is a recognized problem or need in the art including market pressure, design need, etc., and there are a finite number of identified predictable solutions. Consequently, those in the art could have pursued known solutions with reasonable expectation of success. (*KSR v. Teleflex*, 127 S. Ct. 1727 (2007)).

Claim 19:

The combination of **BELADY/GLEIFCHAUF** discloses the limitations as shown in the rejections above. **BELADY/GLEIFCHAUF** does not specifically disclose *a controller is connected to operate a cooling system to maintain the blockchain mining device within a predetermined operating range of temperature.* However, the Examiner takes **OFFICIAL NOTICE** that it is old and well known in the computing arts that server installations generate heat and require cooling systems. In the competitive business climate, there is a profit-driven motive to maximize the profitability of goods and services that are provided or marketed to customers. Enterprises typically use business planning to make decisions in order to maximize profits. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine/modify the method of **BELADY/GLEIFCHAUF** with the technique of utilizing a cooling system because there is a recognized problem or need in the art including market pressure, design need, etc., and there are a finite number of identified predictable solutions. Consequently, those in the art could have pursued known solutions with reasonable expectation of success. (*KSR v. Teleflex*, 127 S. Ct. 1727 (2007)).

Claims 20-23:

The combination of **BELADY/GLEIFCHAUF** discloses the limitations as shown in the rejections above. **BELADY/GLEIFCHAUF** does not specifically disclose*:*

- *the blockchain mining device is mounted on a skid or trailer.*
- *the skid or trailer comprises a generator driven by an engine, which is connected to the source of combustible gas.*
- *the engine comprises a turbine.*
- *the blockchain mining device comprises an intermodal transport container.*

However, the Examiner takes **OFFICIAL NOTICE** that it is old and well known in the oil drilling and exploration arts to utilize common and basic machinery and structural layouts during the process of oil production. In the competitive business climate, there is a profit-driven motive to maximize the profitability of goods and services that are provided or marketed to customers. Enterprises typically use business planning to make decisions in order to maximize profits. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine/modify the method of **BELADY/GLEIFCHAUF** with the technique of utilizing a skids, trailers, generators, turbines, cargo containers and engines because there is a recognized problem or need in the art including market pressure, design need, etc., and there are a finite number of identified predictable solutions. Consequently, those in the art could have pursued known solutions with reasonable expectation of success. (*KSR v. Teleflex*, 127 S. Ct. 1727 (2007)).

Claim 32:

The combination of **BELADY/GLEIFCHAUF** discloses the limitations as shown in the rejections above. **BELADY/GLEIFCHAUF** does not specifically disclose *prior to using the source of combustible gas, the combustion engine is under loaded as the prime mover, and further comprising connecting the generator to a power takeoff connected to the combustion engine.* However, the Examiner takes **OFFICIAL NOTICE** that it is old and well known in the oil drilling and exploration arts to utilize common and basic machinery and structural layouts during the process of oil production. In the competitive business climate, there is a profit-driven motive to maximize the profitability of goods and services that are provided or marketed to customers. Enterprises typically use business planning to make decisions in order to maximize profits. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine/modify the method of **BELADY/GLEIFCHAUF** with the technique of connecting underloaded devices to combustion engine PTO's because there is a recognized problem or need in the art including market pressure, design need, etc., and there are a finite number of identified predictable solutions. Consequently, those in the art could have pursued known solutions with reasonable expectation of success. (*KSR v. Teleflex*, 127 S. Ct. 1727 (2007)).

Examiner's Note – Electronic Communications

The U.S. Patent & Trademark Office's (USPTO) policy regarding communications between examiners and Applicant s via the internet is set forth in MPEP 502.03:

"Without a written authorization by Applicant in place, the USPTO will not respond via Internet e-mail to any Internet correspondence which contains information subject to the confidentiality requirement as set forth in 35 U.S.C. 122... Where a written authorization is given by the Applicant, communications via Internet e-mail...may be used. In such case, a printed copy of the Internet email communications MUST be ... entered in the patent application file."

In addition, Article 8 of the Patent Internet Usage Policy (which is reproduced in MPEP §502.03, subsection V) states in part:

"Internet e-mail shall NOT be used to conduct an exchange of communications similar to those exchanged during telephone or personal interviews unless a written authorization has been given under Patent Internet Usage Policy Article 5 to use Internet e-mail. In such cases, a paper copy of the Internet e-mail contents MUST be made and placed in the patent application file...in the same manner as an Examiner Interview Summary Form is entered."

The Office has a policy of only communicating with the Applicant s by *email, calendar/scheduler applications, or video conferencing tools* with Applicant's informed consent. As noted in Article 6 of the Patent Internet Usage Policy, "[t]he misrepresentation of a sender's identity (i.e., spoofing) is a known risk when using electronic communications. Therefore, Patent Organization users have an obligation to be aware of this risk and conduct their Internet activities in compliance with established procedures." Office employees are not permitted to communicate with Applicant s regarding a patent application via Internet e-mail unless there is written authorization by the Applicant s in the application file. **Applicant is encouraged to submit form PTO/SB/439 to accommodate email correspondence.**

CONCLUSION

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Non Patent Literature:

- **YOUTUBE**. "Using Natural Gas To Mine Bitcoin With Matthew Lohstroh." (18 September 2019). Retrieved online 04/16/2022. https://www.youtube.com/watch?v=TYpsZzlevow
- **WayBack Machine**. "New Century Exploration." (2022). Retrieved online 04/16/2022. https://web.archive.org/web/20220401000000*/https://www.newcenturyexp.com/
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Foreign Art:

- **HANKE TIMO TOBIAS et al.** "BLOCK MINING METHODS AND APPARATUS." (WO 2015/077378 A1)
- **TAYLOR NINA**. "This New Monetary Innovation Method/process Using Crypto Currency Applies To And For Entities, Which Require An Income/revenue Producing Asset Using Any Form Of Named/renamed Crypto Currency, Using Any Form Of Blockchain/chain Process Using The Wallet Which Mints/Mines New Coin Assets." ((AU 2014/101324 A4)
- **TERRY GARY MCALISTER.** "New Stock/share/bond Innovation Using Principle Mined Cryptographic Currency/digital Mining Assets/commodities Which Secondary Mine For Stock/share/bond Holders On/using The Blockchain/any Chain/shared Ledger On A Cryptographic Currency/digital Mining Assets/commodities Exchange." (AU 2016/100178 A4)
- **MCALISTER GARY.** "Blockchain Digital Mining Asset/Commodity Innovation For Private Placement, High Yield Investment, Tier 1,2,3, MTN Buy/sell Structured Financial Trading Programs And Platforms." (AU 2016/100394 A4)

Any inquiry of a general nature or relating to the status of this application or concerning this communication or earlier communications from the Examiner should be directed to **James A. Reagan** (james.reagan@uspto.gov) whose telephone number is **571.272.6710.** The Examiner can normally be reached Monday through Friday from 10 AM to 6 PM. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, **KAMBIZ ABDI** can be reached at **571.272.6702**.

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://portal.uspto.gov/external/portal/pair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at **866.217.9197** (toll-free).

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/JAMES A REAGAN/
Primary Examiner, Art Unit 3688

james.reagan@uspto.gov
571.272.6710 (Office)
571.273.6710 (Desktop Fax)

Examiner-Initiated Interview Summary	**Application No.** 16/484,728	**Applicant(s)** Barbour, Stephen		
	Examiner JAMES A REAGAN	**Art Unit** 3688	**AIA (First Inventor to File) Status** Yes	**Page** 1 of 2

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
JAMES A REAGAN	Primary Examiner	Telephonic
Robbie Nissen	Attorney of Record	

Date of Interview: 15 April 2022

Issues Discussed:

Other

The Examiner held a conference with the Applicant's representative to gain insight and a better understand the claimed invention as well as the oil/natural gas industry as it applies to block chain mining. The discussion involved references that although do not necessarily qualify as prior art, describe the inventive intent. Discussed claim language and construction, such as markush-type claims, industry terms given their standard and reasonable definitions, and use claims (MPEP 2173.05(q) - claim 24). The Examiner considered requiring a restriction against claims 24-41, but will wait until the Applicant has an opportunity to amend. An initial search revealed little in the way of qualified prior art, but did reveal BELADY (USPGP 2014/0096837 A1). Also discussed the third party submission which the Examiner concluded reads adequately on the independent claims. Moving forward, the Examiner suggests drafting independent claims that clearly unite the combustible gas production elements and the block chain mining elements. Allowable subject may reside in dependent claims 12-18, but further searching is required. Applicants representative supplied further relevant references. No agreements were reached. The Applicant's representative is invited to interview with the Examiner after the receipt of the next Office action.

☑ Attachment

/JAMES A REAGAN/ Primary Examiner, Art Unit 3688	

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

Applicant recordation instructions: 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. 16/484,728	Applicant(s)/Patent Under Reexamination Barbour, Stephen	
	Examiner JAMES A REAGAN	Art Unit 3688	Page 1 of 4

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*	I	US-20180284707-A1	10-2018	Menon; Anup	F02C9/28	1/1
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
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*	E	US-20150316903-A1	11-2015	Asmus; Matthew J.	G06Q10/06	700/291
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*	G	US-20150012622-A1	01-2015	Omatsu; Fumio	G06Q10/10	709/220
*	H	US-20120185414-A1	07-2012	Pyle; Richard	G01W1/10	706/11
*	I	US-20140324237-A1	10-2014	Oe; Ryuji	G06Q40/00	700/287
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	Examiner JAMES A REAGAN	Art Unit 3688	Page 3 of 4

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*	G	US-11163280-B2	11-2021	Henson; David	A01G9/26	1/1
*	H	US-10367353-B1	07-2019	McNamara; Michael T.	G06F1/3206	1/1
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	Examiner JAMES A REAGAN	Art Unit 3688	Page 4 of 4

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Inventor and Assignee name search in PE2E Search Tool	04/17/2022	JAR
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
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Interference Search			
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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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Application Number	16484728
Filing Date	2019-08-08
First Named Inventor	Stephen Barbour
Art Unit	
Examiner Name	
Attorney Docket Number	91A-3US

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

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	Examiner Name	
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	2	International Search Report issued on the corresponding PCT application no. PCT/CA2018/050135, 5 pages.	
	3	WIKI, Google Modular Data Center, accessed 2019-10-05 but available at least as early as 2017-02-08, 2 pages, URL=https://en.wikipedia.org/wiki/Google_Modular_Data_Center.	
	4	BITFURY, Block Box AC Mobile Datacenter, available at least as early as 2017-02-08, 3 pages, screenshots taken from Wayback machine Internet archive, URL=https://web.archive.org/web/20170130043612/http:/bitfury.com/products#blockbox-ac.	
	5	WIKI, Intermodal Container, accessed 2019-10-05 but available at least as early as 2017-02-08, 20 pages, URL=https://en.wikipedia.org/wiki/Intermodal_container 6/.	
	6	WIKI, Sun Modular Datacenter, accessed 2019-10-05 but available at least as early as 2017-02-08, 2 pages, URL=https://en.wikipedia.org/wiki/Sun_Modular_Datacenter.	

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature	/JAMES A REAGAN/ (04/16/2022)	Date Considered	04/16/2022

*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.

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16484728
	Filing Date	2019-08-08
	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

[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.

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	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

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	/RobertNissen#64256/	Date (YYYY-MM-DD)	2020-02-05
Name/Print	Robert A. Nissen	Registration Number	64256

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.**

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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 record s.

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.

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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)).

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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.

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BLOCK MINING METHODS AND APPARATUS

DOCUMENT ID	DATE PUBLISHED
WO-2015077378-A1	2015-05-28

INVENTOR INFORMATION

NAME	CITY	STATE	ZIP CODE	COUNTRY
HANKE TIMO TOBIAS	N/A	N/A	N/A	US
LERNER SERGIO DEMIAN	N/A	N/A	N/A	AR

DATE FILED
2014-11-19

FOREIGN APPLICATION PRIORITY DATA

COUNTRY	APPLICATION NO	APPLICATION DATE
US	US201361906310P	

CPC CURRENT

TYPE	CPC	DATE
CPCI	G06Q20/0658	2013-01-01
CPCI	G06Q20/0655	2013-01-01
CPCI	H04L9/3239	2013-01-01
CPCI	G06Q20/3827	2013-01-01
CPCI	H04L9/0643	2013-01-01
CPCA	H04L2209/56	2013-01-01
CPCA	G06Q2220/00	2013-01-01
CPCA	H04L2209/38	2013-01-01

Abstract

Block chain mining methods and apparatus. A mid- state generator develops a plurality, n, of mid-states by selectively varying a portion of the block, and, in particular, the block header. A single message expander develops a message schedule by expanding a message in accordance with a predetermined expansion function; and the message schedule is shared with a plurality, n, of compressors, each developing a result as a function of the message schedule and a respective one of the n unique mid-states in accordance with a predetermined compression function. The compressors can be either rolled core or pipelined core.

New stock/share/bond innovation using principle mined cryptographic currency/digital mining assets/commodities which secondary mine for stock/share/bond holders on/using the Blockchain/any chain/shared ledger on a cryptographic currency/digital mining assets/commodities exchange.

DOCUMENT ID
AU-2016100178-A4

DATE PUBLISHED
2016-03-24

INVENTOR INFORMATION

NAME	CITY	STATE	ZIP CODE	COUNTRY
TERRY GARY MCALISTER	N/A	N/A	N/A	N/A

DATE FILED
2016-02-17

FOREIGN APPLICATION PRIORITY DATA

COUNTRY	APPLICATION NO	APPLICATION DATE
AU	AU2016100178A	

Abstract

Abstract: The invention concerns cryptographic currency/digital mining assets/ commodities for use in the stock/share/bond market industry. More specifically the present invention relates to the provision of cryptographic currency/digital mining assets/commodity stock/share/ bond innovation which fundamentally changes how the stocks/shares/ bonds are discovered, issued, valuated and rated. This is an innovation that addresses what the stocks/shares/bonds now known as digital mining assets/commodities look like and how they are bought, sold and traded on a digital mining assets/ commodities Blockchain exchange. It affects proof of ownership on the Blockchain, investor returns, earnings to shareholders, settlement speed and company strength etc. This innovation is a new stocks/shares/bonds structure using digital mining assets/commodities which are the actual stocks/shares/bonds in the start-ups, businesses, companys and corporations which can then be bought/sold/traded on a new Blockchain shared ledger exchange/platform. New start-ups and existing businesses/companies/ corporations can transition from their old stocks/shares/bonds structure in the existing stocks/shares/bonds market over to this new innovative digital mining assets/commodities stocks/shares/bonds structure on a new digital mining assets/commodities Blockchain exchange. This innovation makes it possible for investors/stakeholders to acquire principle digital mining asset/commodity in a start-up, business/company/corporation in both the primary and secondary market and let their principle digital mining asset/commodity secondary mine for them on exchange and/or off exchange. This is then a new innovative way for investors/stakeholders who would now be shareholders in this new structure to get a stable return on investment without having to sell their principle stocks/ shares/bonds back into the market place. They can simply sell what their start-up/business/company/corporation principle digital mining assets/commodities stocks/shares/bonds secondary mine. This innovation has the potential to completely reshape the industry and drive huge improvements in market efficiency, settlement, security, regulatory, speed of transfer, ownership CIS, KYC, AML. We will use Bankcoin as our example of the digital mining assets/ commodities which has had its

principle Bankcoin mined and is now secondary mining a percentage from 1% onwards pa from the total amount in their Bankcoin digital wallet. Example: if you acquire 1000 Bankcoins it will secondary mine up to 10% pa which equals up to 100 newly mined Bankcoins pa. So when an investor/stakeholder acquires 1000 digital mining asset/commodity stocks/shares/bonds in a start-up/business/company/corporation from the SharesX exchange for example, they will newly secondary mine 100 digital mining This digital mining asset/commodity stocks/shares/bonds innovation assists with market stability being a fixed price with the option of a floating price above that, transparency as the Blockchain is decentralised, security of ownership as investors/shareholders have full control over their digital mining asset/commodity stocks/ shares/bonds both online and offline in their own digital wallet, and minimising tax avoidance by increased transparency and regulatory oversight. Gary McAlister Terry

This new monetary innovation method/process using crypto currency applies to and for entities, which require an income/revenue producing asset using any form of named/renamed crypto currency, using any form of blockchain/chain process using the wallet which mints/mines new coin assets.

DOCUMENT ID
AU-2014101324-A4

DATE PUBLISHED
2014-12-04

INVENTOR INFORMATION

NAME	CITY	STATE	ZIP CODE	COUNTRY
TAYLOR NINA	N/A	N/A	N/A	N/A

DATE FILED
2014-11-03

FOREIGN APPLICATION PRIORITY DATA

COUNTRY	APPLICATION NO	APPLICATION DATE
AU	AU2014101324A	

Abstract

This method/process using crypto currency applies to and for entities, which require an income/revenue producing asset using any form of named/renamed crypto currency, using any form of blockchain/chain process using the wallet which mints/mines new coin assets. This new method/process makes it possible for an entity to acquire a (blockchain or any chain dependent) crypto currency asset to earn revenue, mint and mine new assets and currency, produce, acquire income for that entity and or on behalf of another entity.

From:	Robbie Nissen
To:	Reagan, James
Subject:	Re: U.S patent application no.: 16484728, NPL 91A-3US
Date:	Friday, April 15, 2022 2:35:46 PM
Attachments:	91A-3US_IDS_April_22.pdf efilingAck45486121.pdf NPL1i.pdf efilingAck45486188.pdf sb0439.pdf

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Dear Examiner Reagan,

U.S patent application no.: 16484728
Filed: February 6, 2018
Inventor: Stephen Barbour
NPL file: 91A-3US

As per our discussion I attach copies of the IDS and NPL document efiled today, as well as a copy of an authorization to communicate by email form.

Regards,

Robbie Nissen
Agent of Record
Lawyer, Patent and Trade-mark Agent, B.Sc.
Nissen Patent Law

P: 780-802-7904, F: 888-744-4480
#200, 10328 - 81 Avenue, Edmonton, AB, T6E 1X2
nissenlaw.ca

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Doc Code:IDS.3P
Document Description: Third-Party Submission Under 37 CFR 1.290

PTO/SB/429(08-12)
Approved for use through 07/31/2015. OMB 0651-0031
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THIRD-PARTY SUBMISSION UNDER 37 CFR 1.290	Application Number	16484728

U.S. PATENTS				
Cite No	Patent Number	Kind Code[1]	Issue Date (YYYY-MM-DD)	First Named Inventor

U.S. PATENT APPLICATION PUBLICATIONS				
Cite No	Publication Number	Kind Code[1]	Publication Date (YYYY-MM-DD)	First Named Inventor

FOREIGN PATENTS AND PUBLISHED FOREIGN PATENT APPLICATIONS						
Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[1]	Publication Date (YYYY-MM-DD)	Applicant, Patentee or First Named Inventor	T[5]
						☐

NON-PATENT PUBLICATIONS (e.g., journal article, Office action)			
Cite No	Author (if any), title of the publication, page(s) being submitted, publication date, publisher (where available), place of publication (where available).	T[5]	E[6]

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THIRD-PARTY SUBMISSION UNDER 37 CFR 1.290	Application Number	16484728

1	Reddit posting, dated July 3, 2016. https://www.reddit.com/r/Bitcoin/comments/4r2bjm/mining_with_free_natural_gas/	☐	☒

STATEMENTS

The party making the submission is not an individual who has a duty to disclose information with respect to the above-identified application under 37 CFR 1.56.

This submission complies with the requirements of 35 U.S.C. 122(e) and 37 CFR 1.290.

☐ The fee set forth in 37 CFR 1.290(f) has been submitted herewith.

☐ The fee set forth in 37 CFR 1.290(f) is not required because this submission lists three or fewer total items and, to the knowledge of the person signing the statement after making reasonable inquiry, this submission is the first and the only submission under 35 U.S.C 122(e) filed in the above-identified application by the party making the submission or by a party in privity with the party.

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Signature	/Oliver Strimpel/		
Name/Print	Oliver Strimpel	Registration Number (if applicable)	56451

Examiner Signature	/JAMES A REAGAN/ (04/16/2022)	Date Considered	04/16/2022

*EXAMINER: Signature indicates all documents listed above have been considered,except for citations through which a line is drawn. Draw line through citation if not considered. Include a copy of this form with next communication to applicant. 1. If known, enter kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16. See MPEP 901.04(a). 2. Enter the country or patent office that issued the document, by two-letter code under WIPO standard ST.3. See MPEP 1851. 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. If known, enter the kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 . See MPEP 901.04(a). 5. Check mark indicates translation attached. 6. Check mark indicates evidence of publication attached.

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16484728
Filing Date	2018-02-06
First Named Inventor	Stephen Barbour
Art Unit	
Examiner Name	
Attorney Docket Number	91A-3US

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	9967333		2018-05-08	Dell Products LP	
	2	8305757		2012-11-06	Innertech IP LP	
	3	8254124		2012-08-28	Keisling et al.	
	4	8297067		2012-10-30	Keisling et al.	
	5	8601827		2013-12-10	Keisling et al.	
	6	9282684		2016-03-08	Keisling et al.	
	7	9763366		2017-09-12	Keisling et al.	

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	1	20080135238		2008-06-12	Cugnet, et al.	
	2	20200107475		2020-04-02	Keisling et al.	

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	1	Office Action issued on corresponding Canadian patent application 3090944, January 28, 2022, 3 pages.	

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Examiner Signature	/JAMES A REAGAN/ (04/16/2022)	Date Considered	04/16/2022

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	Attorney Docket Number	91A-3US

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	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

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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	/RobertNissen#64256/	Date (YYYY-MM-DD)	2022-04-15
Name/Print	Robert A. Nissen	Registration Number	64256

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

Patents (bitcoin blockchain mining oil field natural gas flare waste) before:pri

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System and Method for Oil and Condensate Processing



US · US20180274347A1 · Joseph A. Riotto · KATA Systems LLC

Priority 2014-05-20 · Filed 2018-05-25 · Published 2018-09-27

A system and method for the on-site separating and treating of a hydrocarbon liquid stream at an oil and gas production site is disclosed. The system comprises an oil and condensate distillation unit and a vapor recovery unit. In one embodiment, the oil and condensate distillation unit operates at ...

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Published 2016

... Although Norris only mentions this art studio's **gas** leak in ... unit for comparison or a common **field** within which to arrange ... with the stronger odours of linseed **oil** and sour, stale French ...

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... Other pioneers in the **field** include Fujitsu FEELthym , a ... to track **bitcoin**, the Internet-based currency, but has **natural** ... the biggest consumer of **oil** and to have a larger **gas** market than the ...

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... Our world has two sets of **natural** laws. One set tells us ... many such incidents occur in any **field**, they are still nowhere ... reference, does not see "**gas** lights and kerosene lamps and electric ...

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... National **oil** production (crude and **natural gas** liquids) is ... massive Bonga **oil field** --- Nigeria's largest **oil field**, lying within ... of the world **flare** emissions -- after a half century of **oil** and **gas** ...

Sustainable manure management

Google Scholar · sprints.nwisrl.ars.usda.gov · Leytem A · Sustainable animal agriculture
Published 2013
... in the production of pyrolysis **oil** and a low-BTU **gas**), gasification (... it for energy generation or **flare** the CH4 help mitigate this ... Anaerobic digestion is a **natural** biological process by which ...

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Published 2011
... find related information, 3) details about **natural** chemicals found in source waters, and 4) a ... it'sa **gas** that turns to liquid when it touches cold air. In liquid form, it defies gravity. It's one of ...

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... that what I did with it was **natural** but forbidden, did not sit well ... My father would pick up his **gas** mask and a black steel ... It was, we later learned, an air mine that, following the **flare**, had ...

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... sudden insurgent signals: a **flare** launch, blinking lights from a ... accompany undercover agents into the **field**, an unusual trait ... 500,000 injectors of a nerve **gas** antidote to the Iraqi army. A ...

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Published 2009

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Published 2016
... of **natural gas** before 2020 7 and net exporter of **oil** and **gas** ... of shale **oil** from depleted conventional fields) to **flare** around ... recoverable from a potential **oil** or **gas field**--estimates made ...

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Published 2015
... **mining** from the depths under the land and even seabed. ... **Oil** is indispensible for transportation and **natural gas** is ... Since around 1960, there has been a revolution in the **field** of various ...

Factors influencing the development and reform of the upstream **oil** and **gas** fiscal systems in the UK and Nigeria--a comparative study

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... , is a royalty/tax system operated on a **field** by **field** basis. This requires a high level of expertise on ... However, the story of Nigeria's **natural gas** reserves is rather different (and deserves a ...

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Published 1977
... shale in the laboratory to determine **oil**, **gas**, and spent shale ... -bearing formations that have enough **natural** permf abili ty. ... of a small central portion of such a **field**, in which ignition and ...

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Published 1994
... we look out and we see the **natural** world and we know what it is ... Although we **field**-check trips every few years, conditions ... alarms); the common highway **flare** used by motorists has also ...

Unwanted guest

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Published 2014
... Armor thins to solar **flare** seething purple burst Thirst, fugitive morsel drifting violet lagoon Barnacle me, my ... mutually hollow trading a sudden **flare** from solar cavities slowly merging ...

The education of Green Lantern: culture and ideology

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Published 2003
... Lantern is temporarily rendered powerless by the **gas** fumes from canisters being ... **oil** on those deboarding the plane. Senator Jeremiah Clutcher's face is covered with the thick, black **oil**. ...

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Google Scholar · www.uok.edu.pk · Bashir E · Karachi University Journal of Science
Published 2008
... Minerals are one of the principal **natural** resources essential for ... Recently the **mining** activities are increased but their exact ... and logistic support during **field** work. We sincerely thank the ...

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Google Scholar · theoriboi.wordpress.com · al-Qathafi M · The New York Times
Published 2003
... **Field**, the biggest American air base outside the United States. Even the exploitation of vast **oil** ... the Mediterranean Sea, and the **mining** of **natural gas** discovered in the Syrian territory ...

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Published 2011
... memories of the time he was once held up at a **gas** station. ... cyanide and arsenic heap-leach **mining**--past the charred and ... at a time, reclearing the **field** each spring and summer while ...

TIMES

Google Scholar · www.queenstimes.com · Schumer U
Published 1965
... that the United States will ban imports of Russian **oil**, **natural gas**, and coal, New York Attorney Letitia James warned **oil** companies and **gas** stations that price gouging is illegal and ...

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G., they will be able to play them in the living room at no additional cost. Most of the application can be downloaded free of cost and to make game lovers it's like a cherry on the food. ...

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... CEC Model 104 mass spectrometer with **gas** chromatograph interface, and a CEC Model ... the coating under conditions more severe than ordinary **field** conditions. In most instances, flat 4...

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... exploitation of a significant **natural** resource, **oil**, in the Muslim ... either: it is a **field** for endless anthropological and religious ... , of enormous new **oil** and **gas** reserves within the Caspian. ...

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Published 2000
... There was a dash of patchouli **oil** on my temples and a whisper of kohl about my eyes. ... 'Patchouli **oil**,' Dali told her and I was amazed that he should know, as I would always be amazed ...

Patent TW310421B

~~TW~~ • TW310421B • Matsushita Electric Ind Co Ltd
Priority 1993-07-27 • Filed 1995-01-26 • Granted 1997-07-11 • Published 1997-07-11
Printed by the Industrial and Consumer Cooperative of the Central Standardization Bureau of the Ministry of Economic Affairs and applied for a patent Fan 1 -Seed light basket set • It has:-Base 1 Mao _ segment, which can be recorded in the bed logic with the presence of ja and ji pen The star # 中 ...

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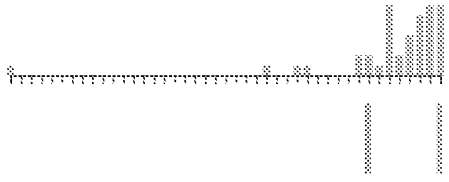
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Published 1892
... -marked epoch to invest in new everythings from ~~oil~~-cloth to cups and saucers. Especially was ... The single jet of **gas**-light depending from the ceiling flared upon the strange simian faces, ...

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... that have been shuffled off the **field**, thus turning our literary ... holes in the ground, like **garbage**? When we have looked on in ... When the horse died of **natural** causes Oleg taunted the ...

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KATA Systems LLC		2.3%
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US · US20180274347A1 · Joseph A. Riotto · KATA Systems LLC
Priority 2014-05-20 · Filed 2018-05-25 · Published 2018-09-27
A system and method for the on-site separating and treating of a hydrocarbon liquid stream at an oil and gas production site is disclosed. The system comprises an oil and condensate distillation unit and a vapor recovery unit. In one embodiment, the oil and condensate distillation unit operates at ...

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... asserting a unit for comparison or a common **field** within which to arrange specificities, but ... odor of **gas**, of old walls, dusty plaster, and over it all the heavy, sour smell of **garbage**—a ...

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... Other pioneers in the **field** include Fujitsu FEELthym , a ... biggest consumer of **oil** and to have a larger **gas** market than ... vessels turn to LNG (liquefied **natural gas**). Depending on the type ...

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... Our world has two sets of **natural** laws. One set tells us ... many such incidents occur in any **field**, they are still nowhere ... reference, does not see "**gas** lights and kerosene lamps and electric ...

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... National **oil** production (crude and **natural gas** liquids) is ... massive Bonga **oil field** -- Nigeria's largest **oil field**, lying within ... of the world **flare** emissions -- after a half century of **oil** and **gas** ...

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... in the production of pyrolysis **oil** and a low-BTU **gas**), gasification (... it for energy generation or **flare** the CH4 help mitigate this ... Anaerobic digestion is a **natural** biological process by which ...

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... that what I did with it was **natural** but forbidden, did not sit well ... My father would pick up his **gas** mask and a black steel ... It was, we later learned, an air mine that, following the **flare**, had ...

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... sudden insurgent signals: a **flare** launch, blinking lights from a ... accompany undercover agents into the **field**, an unusual trait ... 500,000 injectors of a nerve **gas** antidote to the Iraqi army. A ...

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... shale in the laboratory to determine **oil**, **gas**, and spent shale ... -bearing formations that have enough **natural** periuf abili ty. ... of a small central portion of such a **field**, in which ignition and ...

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... He is surprised when a hail of **garbage**, bottles, and tin cans ... Lantern is temporarily rendered powerless by the **gas** fumes ... is covered with the thick, black **oil**. He promises to punish the ...

Economic Evaluation of Magnesite Deposits of Khuzdar, Balochistan, Pakistan

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... Minerals are one of the principal **natural** resources essential for ... Recently the **mining** activities are increased but their exact ... and logistic support during **field** work. We sincerely thank the ...

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... **Field**, the biggest American air base outside the United States. Even the exploitation of vast **oil** ... the Mediterranean Sea, and the **mining** of **natural gas** discovered in the Syrian territory ...

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... and clears particles of dust, **oil** and grease from the exit port, ... **gas**, helium is the second most abundant element in the universe. It is produced by the fractional distillation of **natural gas**, ...

Best of the West 2011: New Stories from the Wide Side of the Missouri

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... memories of the time he was once held up at a **gas** station. ... well as semi-melted plastic **garbage** bags of barely identifiable ... at a time, reclearing the **field** each spring and summer while ...

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Google Scholar • www.queenstimes.com • Schumer U
Published 1965
... that the United States will ban imports of Russian **oil**, **natural gas**, and coal, New York Attorney Letitia James warned **oil** companies and **gas** stations that price gouging is illegal and ...

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... There was a dash of patchouli **oil** on my temples and a whisper of kohl about my eyes. ... 'Patchouli **oil**,' Dali told her and I was amazed that he should know, as I would always be amazed ...

Children of the Ghetto: Being Pictures of a Peculiar People

Google Scholar - books.google.com - Zangwill I
Published 1892
... -marked epoch to invest in new everythings from **oil**-cloth to cups and saucers. Especially was ... The single jet of **gas**-light depending from the ceiling flared upon the strange simian faces, ...

Patent TW310421B

FW - TW310421B - Matsushita Electric Ind Co Ltd
Priority 1993-07-27 • Filed 1995-01-26 • Granted 1997-07-11 • Published 1997-07-11
Printed by the Industrial and Consumer Cooperative of the Central Standardization Bureau of the Ministry of Economic Affairs and applied for a patent Fan 1 --Seed light basket set • It has:-Base 1 Mao _ segment, which can be recorded in the bed logic with the presence of ja and ji pen The star # 中 ...

Toronto, capital of Ukraine: the ends of desire and the beginning of history in Janice Kulyk Keefer's The Green Library

Google Scholar • ojs.lib.uwo.ca • Babiak P • ESC: English Studies in Canada

Published 2003

... that have been shuffled off the **field**, thus turning our literary ... holes in the ground, like **garbage**? When we have looked on in ... When the horse died of **natural** causes Oleg taunted the ...

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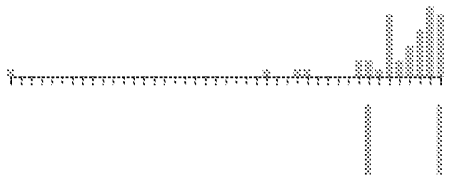
Google Scholar • www.puwon.com • Kaiser S • Journal of Intercultural Ethnopharmacology

Published 2014

... Flavonoids, a class of **natural** products of high pharmacological potency.Biochem ... Antioxidative properties of xanthan on the autoxidation of soybean **oil** in cyclodextrin emulsion.J Agric ...

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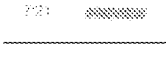
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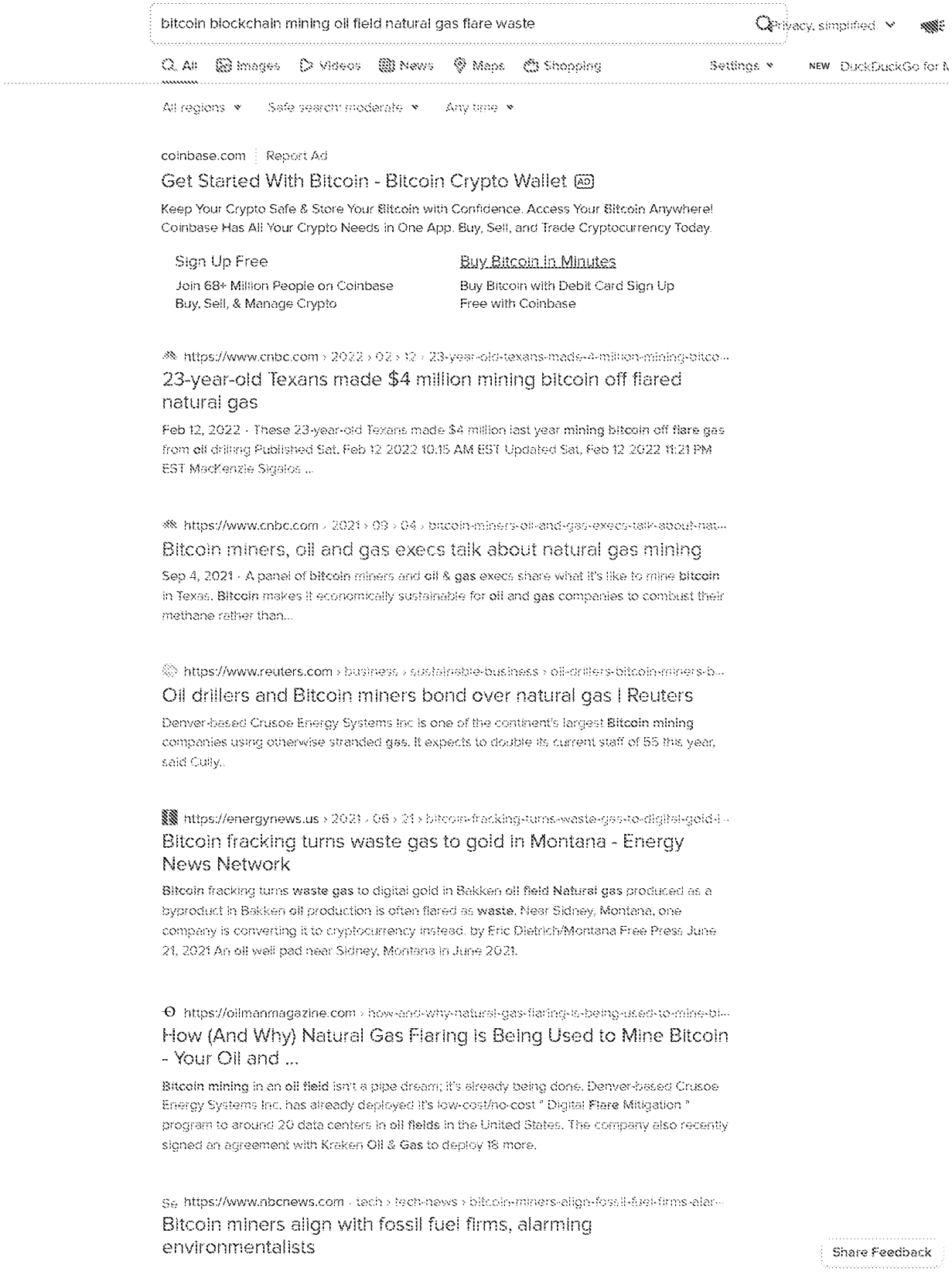
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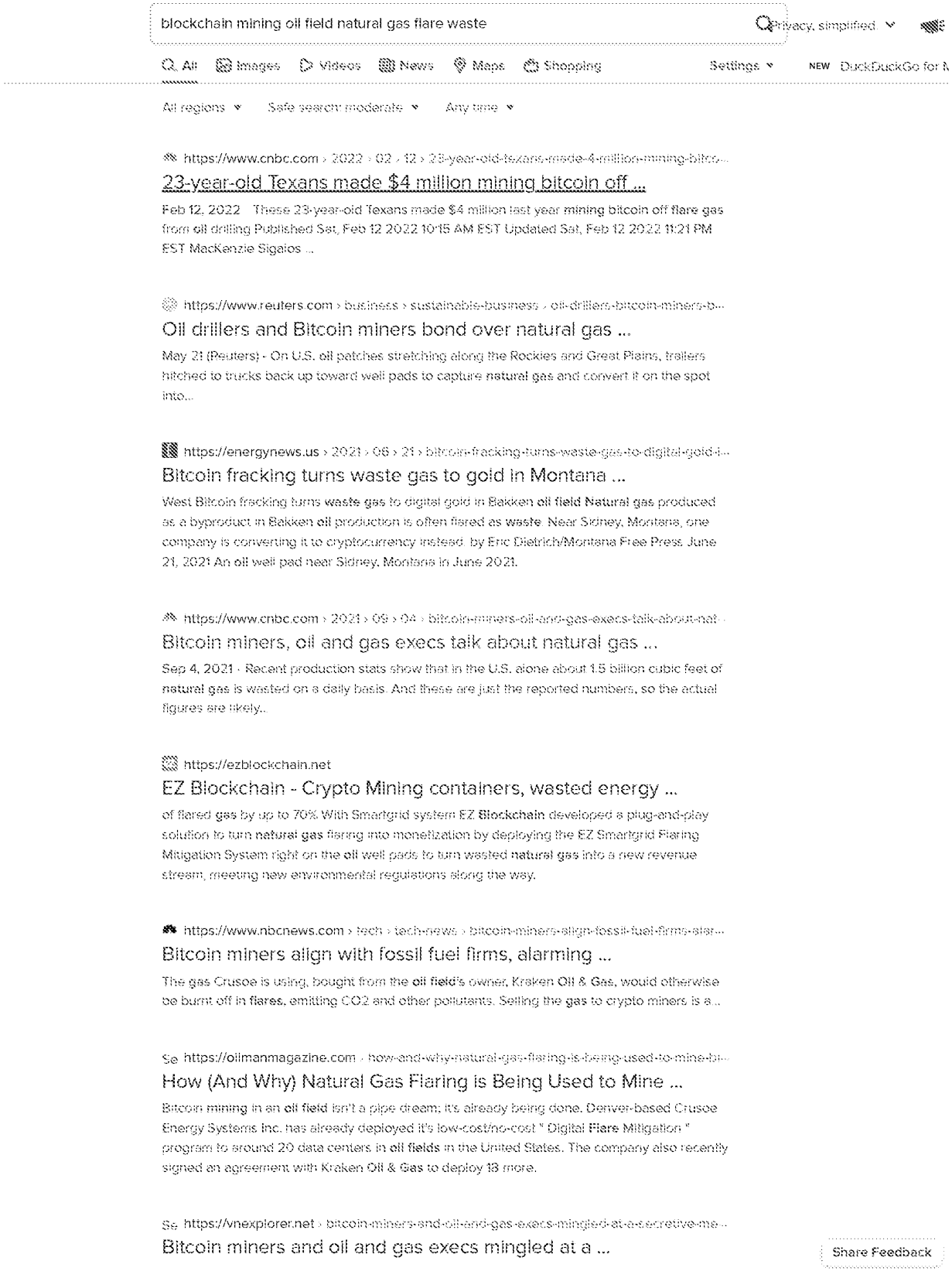
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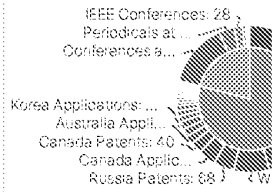
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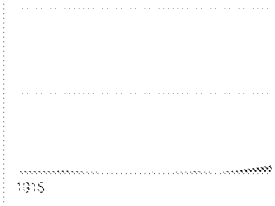
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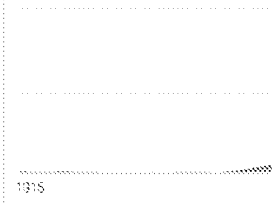
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L11	2	"20080135238"	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	ON	ON	2022/04/16 07:47 AM

L12	3	"20160261685"	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	ON	ON	2022/04/16 07:47 AM
L13	46	("20030196798" OR "20040239499" OR "20050179263" OR "20080135238" OR "20090107671" OR "20100038907" OR "20110199862" OR "20130002443" OR "20130065669" OR "20130112419" OR "20130166455" OR "20130245947" OR "20140237611" OR "20140237614" OR "20140316984" OR "20150261269" OR "20150262139" OR "20150292303" OR "20150294308" OR "20150310424" OR "20150310476" OR "20150356524" OR "20150358943" OR "20150369013" OR "20160010445" OR "20160052814" OR "20160109122" OR "20160112200" OR "20160125040" OR "20160164672" OR "20160214715" OR "20160218879" OR "20160261404" OR "20160261685" OR "20160283920" OR "20160300234" OR "20160319653" OR "20160328713" OR "20160330031" OR "20160330035" OR "20160342977" OR "20160362954" OR "7542947" OR "8156206" OR "8483715" OR "9495668").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/16 07:55 AM
L14	6	("20120077427" OR "20120300291" OR "20120300391" OR "20160128238" OR "20170280594" OR "20200040272").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/16 07:56 AM
L15	46	("20030196798" OR "20040239499" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/16 07:56 AM

		"20050179263" OR "20080135238" OR "20090107671" OR "20100038907" OR "20110199862" OR "20130002443" OR "20130065669" OR "20130112419" OR "20130166455" OR "20130245947" OR "20140237611" OR "20140237614" OR "20140316984" OR "20150261269" OR "20150262139" OR "20150292303" OR "20150294308" OR "20150310424" OR "20150310476" OR "20150356524" OR "20150358943" OR "20150369013" OR "20160010445" OR "20160052814" OR "20160109122" OR "20160112200" OR "20160125040" OR "20160164672" OR "20160214715" OR "20160218879" OR "20160261404" OR "20160261685" OR "20160283920" OR "20160300234" OR "20160319653" OR "20160328713" OR "20160330031" OR "20160330035" OR "20160342977" OR "20160362954" OR "7542947" OR "8156206" OR "8483715" OR "9495668").pn.					
L16	8	((US-20190063252-A1 OR US-20190042990-A1 OR US-20140096837-A1 OR US-20080135238-A1 OR US-20160261685-A1).did. AND PGPB.dbnm.) OR ((US-8849469-B2).did. AND USPT.dbnm.) OR ((US-20080135238-A1 OR US-20160261685-A1).did. AND DWPI.dbnm.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/16 09:06 AM

L17	6	16 AND block$	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/16 09:06 AM
L18	1	16 AND block$chain	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/16 09:06 AM
L19	132	13 OR 14 OR 15	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/04/16 09:07 AM
L20	1	19 AND (blockchain OR block$chain OR "block chain") AND oil AND "natural gas" AND min$3	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:07 AM
L21	17	19 AND (blockchain OR block$chain OR "block chain") AND min$3	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:08 AM
L22	1	19 AND (blockchain OR block$chain OR "block chain") AND (oil OR "natural gas")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:11 AM
L23	4	("2020/0040272").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/16 09:11 AM
L24	128	("5142672" | "5367669" | "5913046" | "6288456" | "6633823" | "7143300" | "7376851" | "7647516" | "7702931" | "7779276" | "7861102" | "7921315" | "7970561" | "8001403" | "8006108" | "8214843" | "8260913" | "8374928" | "8447993" | "8571820" | "8627123" | "8639392" | "8700929" | "8706915" | "8719223" | "8789061" | "8799690" | "9003211" | "9003216" | "9026814" | "9027024" | "9143392" | "9207993" | "9218035"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/16 09:11 AM

		| "9282022" | "9542231" | "9552234" | "9645596" | "9994118" | "10367353" | "10367535" | "10444818" | "10452127" | "10452532" | "10497072" | "10608433" | "10618427" | "10637353" | "20020072868" | "20020158749" | "20030023885" | "20030037150" | "20030074464" | "20040117330" | "20050203761" | "20060161765" | "20080030078" | "20080094797" | "20090055665" | "20090070611" | "20090078401" | "20090089595" | "20090216910" | "20100211810" | "20100235004" | "20100280675" | "20100328849" | "20110072289" | "20110238342" | "20110239010" | "20120000121" | "20120072745" | "20120300524" | "20120306271" | "20120324259" | "20130006401" | "20130063991" | "20130086404" | "20130117621" | "20130187464" | "20130227139" | "20130304903" | "20130306276" | "20140070756" | "20140137468" | "20140180886" | "20140379156" | "20150012113" | "20150121113" | "20150155712" | "20150212122" | "20150229227" | "20150277410" | "20150278968" |					

		"20150288183" | "20150372538" | "20160006066" | "20160011617" | "20160043552" | "20160126783" | "20160170469" | "20160172900" | "20160187906" | "20160198656" | "20160212954" | "20160248631" | "20160324077" | "20170023969" | "20170104336" | "20170261949" | "20170373500" | "20180026478" | "20180144414" | "20180202825" | "20180240112" | "20180366978" | "20180367320" | "20190052094" | "20190168630" | "20190258307" | "20190280521" | "20190318327" | "20190324820" | "20200040272" | "20200051184" | "20200073466" | "20200136387" | "20200136388").pn. OR ("11163280").urpn. AND (PGPB | USPT | USOC).dbnm.					
L25	9	24 AND (blockchain OR block$chain OR "block chain") AND (oil OR "natural gas")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:12 AM
L26	65	("6288456" | "6633823" | "7143300" | "7647516" | "7702931" | "7779276" | "7861102" | "7921315" | "7970561" | "8001403" | "8006108" | "8214843" | "8374928" | "8447993" | "8571820" | "8627123" | "8789061" | "8799690" | "9003211" | "9003216" | "9026814" | "9207993" | "9218035" | "9552234" | "20080030078" | "20080094797" | "20090055665" | "20100211810" |	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/04/16 09:12 AM

		"20100328849" | "20110238342" | "20120000121" | "20120072745" | "20120300524" | "20130006401" | "20130063991" | "20130086404" | "20130187464" | "20130306276" | "20140137468" | "20140379156" | "20150155712" | "20150229227" | "20160198656" | "20160212954" | "20160324077" | "20170104336" | "20180144414").pn. OR ("10367353").urpn. AND (PGPB | USPT | USOC).dbnm.					
L27	18	26 AND (blockchain OR block$chain OR "block chain") AND (oil OR "natural gas")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:12 AM
L28	2615	(blockchain OR block$chain OR "block chain") AND (oil OR "natural gas")	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:13 AM
L29	156	28 AND (blockchain OR block$chain OR "block chain") AND ((oil OR "natural gas") SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:13 AM
L30	0	28 AND (blockchain OR block$chain OR "block chain") AND ((oil OR "natural gas") SAME generator SAME server SAME mining)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:14 AM
L31	5	28 AND ((blockchain OR block$chain OR "block chain") SAME server SAME mining) AND ((oil OR "natural gas") SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:14 AM
L32	36	28 AND ((blockchain OR block$chain OR "block chain") SAME server SAME mining) AND ((oil OR "natural gas"))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:15 AM
L33	22	28 AND ((blockchain OR block$chain OR "block chain") SAME	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:16 AM

		server SAME mining) AND (generator)					
L34	121	((blockchain OR block$chain OR "block chain") SAME server SAME mining) AND (generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:16 AM
L35	1024	((blockchain OR block$chain OR "block chain") SAME mining) AND (generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:19 AM
L36	42	((blockchain OR block$chain OR "block chain") SAME mining) AND (generator WITH gas)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:19 AM
L37	439	((blockchain OR block$chain OR "block chain" OR "distributed ledger") SAME mining SAME server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:22 AM
L38	6	37 AND (server SAME electric$4 SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:22 AM
L39	8	37 AND (server SAME (electric$4 OR power) SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:24 AM
L40	176	37 AND (server SAME (electric$4 OR power))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:25 AM
L41	717	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME mining SAME server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:26 AM
L42	9	41 AND (server SAME electric$4 SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:27 AM
L43	3	"9982516"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:27 AM
L44	2	"20150337218"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:28 AM
L45	107	41 AND (vented OR flared OR wast$4) AND (natural OR methane OR gas)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:34 AM
L46	9	41 AND (server SAME electric$4 SAME power SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:37 AM
L47	4507	((blockchain OR	(US-PGPUB; USPAT;	OR	ON	ON	2022/04/16

		block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME mining)	EPO; JPO)				09:38 AM
L48	17	47 AND (server SAME electric$4 SAME power SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 09:38 AM
L49	4765	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 10:05 AM
L50	17	49 AND (server SAME electric$4 SAME power SAME (generator OR genereation))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 10:06 AM
L51	39	49 AND ((computer OR server) SAME electric$4 SAME power SAME (generator OR genereation))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 10:06 AM
L52	156	49 AND ((computer OR server) SAME (electric$4 OR power) SAME (generator OR genereation))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 10:06 AM
L53	738	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining) SAME server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:24 AM
L54	10	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining) SAME server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:24 AM

L55	339	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining)) AND (server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:25 AM
L56	952	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:27 AM
L57	98	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) SAME (server SAME generator)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:27 AM
L58	85	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME (power WITH generator))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:28 AM
L59	39	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:30 AM

		cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME (electric$4 WITH generator))					
L60	33	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) AND (server SAME ((portable OR mobile) WITH generator))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:31 AM
L61	4045	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) SAME (mine OR mining OR verify OR verification OR verifying)) WITH (server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:31 AM
L62	1936	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) WITH (mine OR mining OR verify OR verification OR verifying)) WITH (server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:32 AM
L63	58	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) WITH (mine OR mining) SAME (verify OR verification OR verifying)) WITH (server)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 11:32 AM

L64	97	"7525207"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:34 PM
L65	2	"20140096837"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:34 PM
L66	3	"8683823"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:34 PM
L67	4	"9100089"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:35 PM
L68	1	"20150321739"	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:35 PM
L69	156	49 AND ((computer OR server) SAME (electric$4 OR power) SAME (generator OR generetion))	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:39 PM
L70	102	69 AND ("natural gas", OR methane OR flare OR burn$3 OR waste biogas)	(US-PGPUB; USPAT; EPO; JPO)	OR	ON	ON	2022/04/16 02:42 PM
L71	1	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) WITH (mine OR mining) SAME (verify OR verification OR verifying)) WITH (server)	(EPO; JPO)	OR	ON	ON	2022/04/16 02:42 PM
L72	1	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining) (verify OR verification OR verifying)) (server)	(EPO; JPO)	SAME	ON	ON	2022/04/16 02:43 PM
L73	13	(blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining)	(EPO; JPO)	SAME	ON	ON	2022/04/16 02:43 PM
L74	14	(blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR	(EPO; JPO)	AND	ON	ON	2022/04/16 02:44 PM

		cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining)					
L75	892	(blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining)	(FPRS; EPO; JPO)	AND	ON	ON	2022/04/16 02:44 PM
L76	23	((blockchain OR block$chain OR "block chain" OR "distributed ledger" OR crypto OR cryptocurrency OR crypto$currency OR crypto$coin OR cryptocoin) (mine OR mining) (verify OR verification OR verifying)) (server)	(FPRS; EPO; JPO)	SAME	ON	ON	2022/04/16 02:44 PM

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1 Making Crimes?: Technology, Law, and DIY Firearms Tallman, Mark A., ProQuest Dissertations and Theses ProQuest Dissertations Publishing, (2017) KWIC

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Blockchain Digital Mining Asset/Commodity innovation for Private Placement, High Yield Investment, Tier 1,2,3, MTN buy/sell Structured financial Trading Programs and Platforms.

DOCUMENT ID	DATE PUBLISHED
AU-2016100394-A4	2016-05-19

INVENTOR INFORMATION

NAME	CITY	STATE	ZIP CODE	COUNTRY
MCALISTER GARY	N/A	N/A	N/A	N/A

DATE FILED
2016-04-11

FOREIGN APPLICATION PRIORITY DATA

COUNTRY	APPLICATION NO	APPLICATION DATE
AU	AU2016100394A	

Abstract

Abstract: This innovation is fundamental in bringing these programs and platforms into the digital mining asset/commodity Blockchain replacing the fiat/cash component that is required to start a typical program. Digital mining assets/commodities with the option of having the Blockchain digital mining wallets installed at the top 50 banks and/or at the Bankcoin Reserve with the new digital mining commodities using Blockchain technology. We will use Bankcoin as the digital mining asset/commodity throughout this innovation filing (it could be any digital mining commodity) as we have already tested it to make sure this innovation can be duplicated and replicated by those who want to exploit it via a license agreement. We will also use the Bankcoin Reserve throughout this process as it is the number 1 Top AAA Rated Digital mining asset/commodity entity/authority able to facilitate between client and trader, block the use of the clients Bankcoins from the client as a requirement of the trader, allow trader access via a remote desktop connection application where traders can go through all aspects of the digital mining asset/commodity digital Bankcoin wallet and monitor its mining and balance in real time, and store/secure the clients digital mining assets/commodities in their digital wallet for the term of the agreement with the broker.

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16484728
Filing Date	2018-02-06
First Named Inventor	Stephen Barbour
Art Unit	
Examiner Name	
Attorney Docket Number	91A-3US

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	1	20170280594		2017-09-28	Sato	
	2	20120300391		2012-11-21	Kiesling	
	3	20120077427		2012-03-29	Wei	
	4	20160128238		2016-05-05	Shedd	
	5	20120300291		2012-11-29	Abbott	

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16484728
	Filing Date	2018-02-06
	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

	6	20200040272		2020-02-06	Cavness			

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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							

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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	BITMAIN, Antminer T9+, accessed 2019-04-24 but available as early as 2018-02-03, 3 pages, Screenshots taken from Wayback machine Internet archive, URL=https://web.archive.org/web/20180217221522/http://shop.bitmain.com/productDetail.htm?pid=00020180130130212850 6gKIcpoR06AA	
	2	SEA-CAN CONTAINERS LTD, Shipping Containers, accessed 2020-01-17 but available as early as 2018-07-03, 3 pages, Screenshots taken from Wayback machine Internet archive, URL=https://web.archive.org/web/20180703184711/http://seacan.com/shipping-containers/.	

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EXAMINER SIGNATURE

Examiner Signature	/JAMES A REAGAN/ (04/16/2022)	Date Considered	04/16/2022

*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.

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16484728
	Filing Date	2018-02-06
	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

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	/RobertNissen#64256/	Date (YYYY-MM-DD)	2021-05-13
Name/Print	Robert A. Nissen	Registration Number	64256

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 record s.

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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)).

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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.

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

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16484728
Filing Date	2018-02-06
First Named Inventor	Stephen Barbour
Art Unit	
Examiner Name	
Attorney Docket Number	91A-3US

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	9967333		2018-05-08	Dell Products LP	
	2	8305757		2012-11-06	Innertech IP LP	
	3	8254124		2012-08-28	Keisling et al.	
	4	8297067		2012-10-30	Keisling et al.	
	5	8601827		2013-12-10	Keisling et al.	
	6	9282684		2016-03-08	Keisling et al.	
	7	9763366		2017-09-12	Keisling et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16484728
	Filing Date	2018-02-06
	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

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	20080135238		2008-06-12	Cugnet, et al.	
	2	20200107475		2020-04-02	Keisling et al.	

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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	Office Action issued on corresponding Canadian patent application 3090944, January 28, 2022, 3 pages.	

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Examiner Signature		Date Considered	

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	Application Number	16484728
	Filing Date	2018-02-06
	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

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☒ A certification statement is not submitted herewith.

SIGNATURE

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Signature	/RobertNissen#64256/	Date (YYYY-MM-DD)	2022-04-15
Name/Print	Robert A. Nissen	Registration Number	64256

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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 Acknowledgement Receipt	
EFS ID:	45486121
Application Number:	16484728
International Application Number:	
Confirmation Number:	1944
Title of Invention:	BLOCKCHAIN MINE AT OIL OR GAS FACILITY
First Named Inventor/Applicant Name:	Stephen Barbour
Customer Number:	130443
Filer:	Robert Anton Nissen
Filer Authorized By:	
Attorney Docket Number:	91A-3US
Receipt Date:	15-APR-2022
Filing Date:	06-JAN-2020
Time Stamp:	14:25:44
Application Type:	U.S. National Stage under 35 USC 371

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	Information Disclosure Statement (IDS) Form (SB08)	91A-3US_IDS_April_22.pdf	1034645 227a39d1bc622f728cc90f016b41ade64490fce2	no	5

Warnings:

Information:					
2	Non Patent Literature	NPL1i.pdf	685137 eea6d099bb60eb97f1f5fa9aaae7497834048002	no	3
Warnings:					
Information:					
			Total Files Size (in bytes):	1719782	

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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.

Doc Code: ECOMM.AUTH/ECOMM.WTDW
Doc Description: Internet Communications Authorization/Internet Communications Authorization Withdrawal

PTO/SB/439 (11-15)

AUTHORIZATION FOR INTERNET COMMUNICATIONS IN A PATENT APPLICATION OR REQUEST TO WITHDRAW AUTHORIZATION FOR INTERNET COMMUNICATIONS		
	Application No.	16484728
	Filing Date	2018-02-06
	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Practitioner Docket No.	91A-3US

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

I. To authorize permission for Internet Communications.

☒ Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with the undersigned and practitioners in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via video conferencing, instant messaging, or electronic mail. I understand that a copy of these communications will be made of record in the application file. (MPEP 502.03)

II. To withdraw authorization for Internet Communications.

☐ The authorization given on _____, to the USPTO to communicate with the undersigned and any practitioner in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via Internet communications such as video conferencing, instant messaging, or electronic mail is hereby withdrawn. I understand that the withdrawal is effective when approved rather than when received.

I am the

☐ applicant.

☒ attorney or agent of record. Registration number 64256.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/robertnissen#64256/ — Signature

April 15, 2022 — Date

Robert A. Nissen — Typed or printed name

780-802-7904 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Juristic entities must be represented by a patent practitioner (see 37 CFR 1.31, which is applicable to any paper filed on or after September 16, 2012, that is presented on behalf of a juristic entity, regardless of application filing date). Submit multiple forms if more than one signature is required, see below*.

☒ * Total of 1 forms are submitted.

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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.

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Electronic Acknowledgement Receipt	
EFS ID:	45486188
Application Number:	16484728
International Application Number:	
Confirmation Number:	1944
Title of Invention:	BLOCKCHAIN MINE AT OIL OR GAS FACILITY
First Named Inventor/Applicant Name:	Stephen Barbour
Customer Number:	130443
Filer:	Robert Anton Nissen
Filer Authorized By:	
Attorney Docket Number:	91A-3US
Receipt Date:	15-APR-2022
Filing Date:	06-JAN-2020
Time Stamp:	14:30:03
Application Type:	U.S. National Stage under 35 USC 371

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	Internet Communications Authorized	sb0439.pdf	186158 01dbb433a250ced777ee304b68d215a3fd8d0f2b	no	2
Warnings:					

Information:	
Total Files Size (in bytes):	186158

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New Applications Under 35 U.S.C. 111
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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.
16/484,728	01/06/2020	Stephen Barbour	91A-3US	1944

130443 7590 08/12/2021

Nissen Patent Law
#200, 10328- 81 Ave
Edmonton, ALBERTA T6E1X2
CANADA

EXAMINER	
ART UNIT	PAPER NUMBER
3685	
MAIL DATE	DELIVERY MODE
08/12/2021	PAPER

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

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.
16/484,728	01/06/2020	Barbour, Stephen	91A-3US

	EXAMINER	
Nissen Patent Law #200, 10328- 81 Ave Edmonton, T6E1X2		
	ART UNIT	PAPER
	3600	20210810

DATE MAILED: _____

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

Commissioner for Patents

A third-party submission under 37 CFR 1.290 was filed on 08/09/2021 and is being entered in the above-identified application. Please allow a few days for the submission to be visible in the Patent Application Information Retrieval (PAIR) system. Note that the submission will be identified using the "Information Disclosure Statement Filed" Document Description. This Document Description is being used for internal purposes only. The Office does not consider the submission to be an Information Disclosure Statement under 37 CFR 1.97 and 1.98.

Any questions regarding this communication should be directed to Will Brandenburg at (571)270-5488.

/WILLIAM A BRANDENBURG/ Quality Assurance Specialist, TC 3600	/W.A.B/ Quality Assurance Specialist, TC 3600

PTO-90C (Rev.04-03)

THIRD-PARTY SUBMISSION UNDER 37 CFR 1.290
CONCISE DESCRIPTION OF RELEVANCE

Application Number	16484728

U.S. PATENTS

Cite No	Patent Number	Concise Description of Relevance

U.S. PATENT APPLICATION PUBLICATION

Cite No	Publication Number	Concise Description of Relevance

FOREIGN PATENT DOCUMENTS		
CiteNo	**Foreign Document Number**	**Concise Description of Relevance**

NON-PATENT PUBLICATIONS		
Cite No	**Reference**	**Concise Description of Relevance**
1	Reddit posting, dated July 3, 2016. https://www.reddit.com/r/Bitcoin/comments/4r2bjm/mining_with_free_natural_gas/	Submitted separately herewith.

PTO/SB/429(08-12)
Approved for use through 07/31/2015. OMB 0651-0031
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.

THIRD-PARTY SUBMISSION UNDER 37 CFR 1.290	Application Number	16484728

U.S. PATENTS				
Cite No	Patent Number	Kind Code[1]	Issue Date (YYYY-MM-DD)	First Named Inventor

U.S. PATENT APPLICATION PUBLICATIONS				
Cite No	Publication Number	Kind Code[1]	Publication Date (YYYY-MM-DD)	First Named Inventor

FOREIGN PATENTS AND PUBLISHED FOREIGN PATENT APPLICATIONS						
Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[1]	Publication Date (YYYY-MM-DD)	Applicant, Patentee or First Named Inventor	T[5]
						☐

NON-PATENT PUBLICATIONS (e.g., journal article, Office action)			
Cite No	Author (if any), title of the publication, page(s) being submitted, publication date, publisher (where available), place of publication (where available).	T[5]	E[6]

THIRD-PARTY SUBMISSION UNDER 37 CFR 1.290	Application Number	16484728

1	Reddit posting, dated July 3, 2016. https://www.reddit.com/r/Bitcoin/comments/4r2bjm/mining_with_free_natural_gas/	☐	☒

STATEMENTS

The party making the submission is not an individual who has a duty to disclose information with respect to the above-identified application under 37 CFR 1.56.

This submission complies with the requirements of 35 U.S.C. 122(e) and 37 CFR 1.290.

☐ The fee set forth in 37 CFR 1.290(f) has been submitted herewith.

☐ The fee set forth in 37 CFR 1.290(f) is not required because this submission lists three or fewer total items and, to the knowledge of the person signing the statement after making reasonable inquiry, this submission is the first and the only submission under 35 U.S.C 122(e) filed in the above-identified application by the party making the submission or by a party in privity with the party.

☒ This resubmission is being made responsive to a notification of non-compliance issued for an earlier filed third-party submission. The corrections in this resubmission are limited to addressing the non-compliance. As such, the party making this resubmission: (1) requests that the Office apply the previously-paid fee set forth in 37 CFR 1.290(f), or (2) states that no fee is required to accompany this resubmission as the undersigned is again making the fee exemption statement set forth in 37 CFR 1.290(g).

Signature	/Oliver Strimpel/		
Name/Print	Oliver Strimpel	Registration Number (if applicable)	56451

Examiner Signature		Date Considered	

*EXAMINER: Signature indicates all documents listed above have been considered,except for citations through which a line is drawn. Draw line through citation if not considered. Include a copy of this form with next communication to applicant. 1. If known, enter kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16. See MPEP 901.04(a). 2. Enter the country or patent office that issued the document, by two-letter code under WIPO standard ST.3. See MPEP 1851. 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. If known, enter the kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 . See MPEP 901.04(a). 5. Check mark indicates translation attached. 6. Check mark indicates evidence of publication attached.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No.:	16/484,728	Confirmation No.: 1944
Filed:	August 8, 2019	
For:	BLOCKCHAIN MINE AT OIL OR GAS FACILITY	
Inventors:	Stephen Barbour.	
Art Unit:	3685	
Examiner:	N/A	

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

THIRD-PARTY PRE-ISSUANCE SUBMISSION UNDER 35 U.S.C. 122(e)

A concise description of the asserted relevance of the item identified in submitted document is provided below. In particular, a comparison of pending claim 1 of this application and the patent publication submitted herewith is provided.

Dated: August 6, 2021

Respectfully submitted,

/Oliver Strimpel/

Oliver Strimpel
Registration No. 56,451

PRE_ISSUANCE SUBMISSION FOR U.S. PATENT APPLICATION NO. 17/087,928

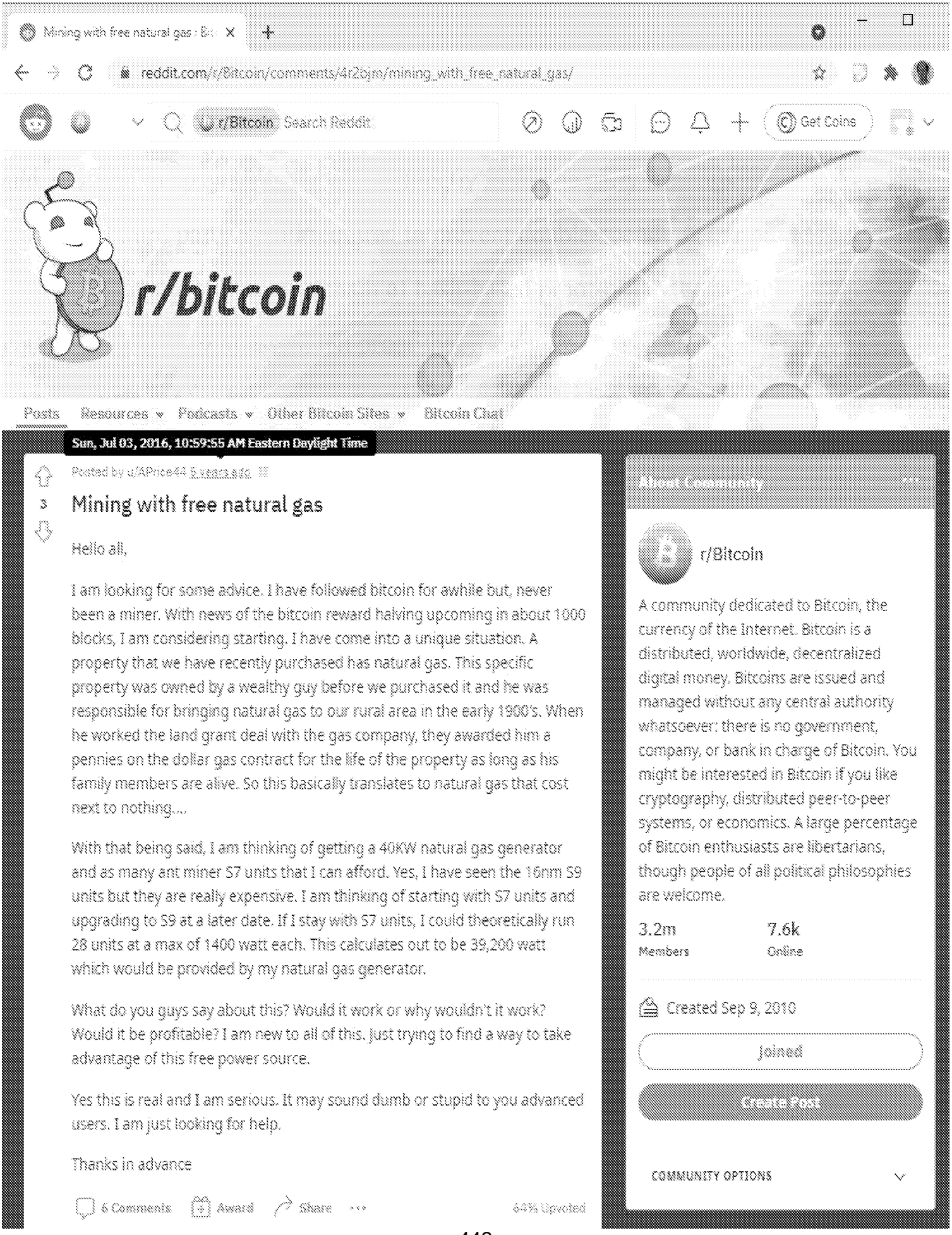
This submission is based on a Reddit posting dated July 3, 2016. The posting may be found at https://www.reddit.com/r/Bitcoin/comments/4r2bjm/mining_with_free_natural_gas/ and a PDF copy of the posting is submitted herewith.

As described in detail in the chart below, the Reddit posting discloses a source of combustible gas, a generator that generate electricity from combustion of the gas, and a blockchain mining device.

Table 1 below provides a concise description of the relevance of the Reddit posting to independent claim 1 of U.S. Patent Application 16/484,728 to Barbour (Barbour application).

TABLE 1	
Barbour application	**Reddit posting**
1. A system comprising: a source of combustible gas produced from an oil production, storage, or processing facility;	The Reddit posting discloses "A property that we have recently purchased has natural gas. This specific property was owned by a wealthy guy before we purchased it and he was responsible for bringing natural gas to our rural area in the early 1900's. When he worked the land grant deal with the gas company, they awarded him a pennies on the dollar gas contract for the life of the property as long as his family members are alive."
a generator connected to the source of combustible gas; and	The Reddit posting discloses "I am thinking of getting a 40KW natural gas generator…" "This calculates out to be 39,200 watt which would be provided by my natural gas generator."
A blockchain mining device connected to the generator.	The Reddit posting discloses: "I am looking for some advice. I have followed bitcoin for awhile but, never been a miner. With news of the bitcoin reward halving upcoming in about 1000 blocks, I am considering starting. " "With that being said, I am thinking of getting a 40KW natural gas generator and as many ant miner S7 units that I can afford. Yes, I have seen the 16nm S9 units but they are

	really expensive. I am thinking of starting with S7 units and upgrading to S9 at a later date. If I stay with S7 units, I could theoretically run 28 units at a max of 1400 watt each. This calculates out to be 39,200 watt which would be provided by my natural gas generator." The Antminer S7 is a Bitcoin miner from Bitmain Mining Company. The Antminer S7-LN miner was released in June 2016, just before the posting date of the Reddit posting. See, e.g., https://miningwatchdog.com/asic/miner-detail/bitmain-antminer-s7-ln-antminer-s7-ln


Mining with free natural gas : Bi
reddit.com/r/Bitcoin/comments/4r2bjm/mining_with_free_natural_gas/
r/Bitcoin
Search Reddit
Get Coins
r/bitcoin
Posts
Resources
Podcasts
Other Bitcoin Sites
Bitcoin Chat
Sun, Jul 03, 2016, 10:59:55 AM Eastern Daylight Time
Posted by u/APrice44 5 years ago
3
Mining with free natural gas
Hello all,
I am looking for some advice. I have followed bitcoin for awhile but, never been a miner. With news of the bitcoin reward halving upcoming in about 1000 blocks, I am considering starting. I have come into a unique situation. A property that we have recently purchased has natural gas. This specific property was owned by a wealthy guy before we purchased it and he was responsible for bringing natural gas to our rural area in the early 1900's. When he worked the land grant deal with the gas company, they awarded him a pennies on the dollar gas contract for the life of the property as long as his family members are alive. So this basically translates to natural gas that cost next to nothing....
With that being said, I am thinking of getting a 40KW natural gas generator and as many ant miner S7 units that I can afford. Yes, I have seen the 16nm S9 units but they are really expensive. I am thinking of starting with S7 units and upgrading to S9 at a later date. If I stay with S7 units, I could theoretically run 28 units at a max of 1400 watt each. This calculates out to be 39,200 watt which would be provided by my natural gas generator.
What do you guys say about this? Would it work or why wouldn't it work? Would it be profitable? I am new to all of this. Just trying to find a way to take advantage of this free power source.
Yes this is real and I am serious. It may sound dumb or stupid to you advanced users. I am just looking for help.
Thanks in advance
6 Comments
Award
Share
64% Upvoted
About Community
r/Bitcoin
A community dedicated to Bitcoin, the currency of the Internet. Bitcoin is a distributed, worldwide, decentralized digital money. Bitcoins are issued and managed without any central authority whatsoever: there is no government, company, or bank in charge of Bitcoin. You might be interested in Bitcoin if you like cryptography, distributed peer-to-peer systems, or economics. A large percentage of Bitcoin enthusiasts are libertarians, though people of all political philosophies are welcome.
3.2m
Members
7.6k
Online
Created Sep 9, 2010
Joined
Create Post
COMMUNITY OPTIONS

Electronic Acknowledgement Receipt	
EFS ID:	43455754
Application Number:	16484728
International Application Number:	
Confirmation Number:	1944
Title of Invention:	BLOCKCHAIN MINE AT OIL OR GAS FACILITY
First Named Inventor/Applicant Name:	Stephen Barbour
Customer Number:	130443
Filer:	Oliver Strimpel
Filer Authorized By:	
Attorney Docket Number:	91A-3US
Receipt Date:	09-AUG-2021
Filing Date:	06-JAN-2020
Time Stamp:	11:15:34
Application Type:	

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	Concise Description of Relevance	Concise-description-generated.pdf	32774 0f8e7417647cd73dee28b6283911ea637f2c2c84	no	2

Warnings:

Information:					
2	Third-Party Submission Under 37 CFR 1.290	Third-party-preissuance-submission.pdf	52976 6aa376e47db3d5eb7b77d97c4f5b81b5f90e58d1	no	2
Warnings:					
Information:					
3	Request for Notification of Non-compliant Third-Party Submission	Third-party-notification-request.pdf	23609 c97e72eefa46ed0739927ab5c603188c321b6df7	no	1
Warnings:					
Information:					
4	Concise Description of Relevance	Third_Party_Submission_Barbour_Revised.pdf	184762 1e6846ab73828e5c25857039656e92c2f383d5da	no	3
Warnings:					
Information:					
5	Evidence of Publication	Reddit_Post_July_3_2016.pdf	326395 8e9632f0c718b382be9512f5da9814dcd69ad22e	no	1
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:					
			Total Files Size (in bytes):	620516	

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.

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
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	16484728
Filing Date	2018-02-06
First Named Inventor	Stephen Barbour
Art Unit	
Examiner Name	
Attorney Docket Number	91A-3US

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	20170280594		2017-09-28	Sato	
	2	20120300391		2012-11-21	Kiesling	
	3	20120077427		2012-03-29	Wei	
	4	20160128238		2016-05-05	Shedd	
	5	20120300291		2012-11-29	Abbott	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16484728
	Filing Date	2018-02-06
	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

	6	20200040272		2020-02-06	Cavness			

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] i	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							

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	BITMAIN, Antminer T9+, accessed 2019-04-24 but available as early as 2018-02-03, 3 pages, Screenshots taken from Wayback machine Internet archive, URL=https://web.archive.org/web/20180217221522/http://shop.bitmain.com/productDetail.htm?pid=00020180130130212850 6gKIcpoR06AA	
	2	SEA-CAN CONTAINERS LTD, Shipping Containers, accessed 2020-01-17 but available as early as 2018-07-03, 3 pages, Screenshots taken from Wayback machine Internet archive, URL=https://web.archive.org/web/20180703184711/http://seacan.com/shipping-containers/.	

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	16484728
	Filing Date	2018-02-06
	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

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	/RobertNissen#64256/	Date (YYYY-MM-DD)	2021-05-13
Name/Print	Robert A. Nissen	Registration Number	64256

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 record s.

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 Acknowledgement Receipt	
EFS ID:	42716613
Application Number:	16484728
International Application Number:	
Confirmation Number:	1944
Title of Invention:	BLOCKCHAIN MINE AT OIL OR GAS FACILITY
First Named Inventor/Applicant Name:	Stephen Barbour
Customer Number:	130443
Filer:	Robert Anton Nissen
Filer Authorized By:	
Attorney Docket Number:	91A-3US
Receipt Date:	13-MAY-2021
Filing Date:	06-JAN-2020
Time Stamp:	16:01:04
Application Type:	U.S. National Stage under 35 USC 371

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	Information Disclosure Statement (IDS) Form (SB08)	91A-3US_IDS_May2021.pdf	1034766 e4de6b0ac3e240bb946939e1aed873b5cdb61ff3	no	4

Warnings:

Information:					
2	Non Patent Literature	NPL1.pdf	300929 8434518618f43206234e0409c7744478c9de501d	no	3
Warnings:					
Information:					
3	Non Patent Literature	NPL2.pdf	243876 547693fc0a84427fdd47b245ebb75dfe9bff2c31	no	3
Warnings:					
Information:					
			Total Files Size (in bytes):	1579571	

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/484,728

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	300
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	520
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	760
TOTAL CLAIMS (37 CFR 1.16(i))	41 minus 20 =	* 21			OR	x 100 =	2100
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*				x 460 =	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	3680

APPLICATION AS AMENDED - PART II

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

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

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

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/484,728	01/06/2020	3685	2910	91A-3US	41	2

CONFIRMATION NO. 1944

UPDATED FILING RECEIPT

130443
Nissen Patent Law
#200, 10328- 81 Ave
Edmonton, AB T6E1X2
CANADA

OC000000118490161

Date Mailed: 04/24/2020

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)

Stephen Barbour, Lloydminster, CANADA;

Applicant(s)

Upstream Data Inc., Lloydminster, CANADA;

Power of Attorney: The patent practitioners associated with Customer Number 130443

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/CA2018/050135 02/06/2018
which claims benefit of 62/456,380 02/08/2017

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

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

If Required, Foreign Filing License Granted: 11/03/2019

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/484,728**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

Title

BLOCKCHAIN MINE AT OIL OR GAS FACILITY

Preliminary Class

705

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

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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.

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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.

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U.S. APPLICATION NO.	FIRST NAMED INVENTOR	ATTY. DOCKET NO.
16/484,728	Stephen Barbour	91A-3US

130443
Nissen Patent Law
#200, 10328- 81 Ave
Edmonton, AB T6E1X2
CANADA

INTERNATIONAL APPLICATION NO.	
PCT/CA2018/050135	
I.A. FILING DATE	PRIORITY DATE
02/06/2018	02/08/2017

CONFIRMATION NO. 1944
371 ACCEPTANCE LETTER

OC000000116490162

Date Mailed: 04/24/2020

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office, in its capacity as a Designated / Elected Office (37 CFR 1.495), has ACCEPTED the above identified international application for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above. A Filing Receipt will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE "FILING DATE or 371(c) DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1) and (c)(2) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN BELOW.** The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363)

01/06/2020
DATE OF RECEIPT OF 35 U.S.C.
371(c)(1) and (c)(2) REQUIREMENTS

The following items have been received:

- Copy of the International Application filed on 08/08/2019
- Copy of the International Search Report filed on 08/08/2019
- Preliminary Amendments filed on 01/06/2020
- Inventor's Oath or Declaration filed on 01/06/2020
- U.S. Basic National Fees filed on 08/08/2019
- Authorize Access to Search Results filed on 08/08/2019
- Priority Documents filed on 08/08/2019
- Power of Attorney filed on 01/06/2020
- Specification filed on 08/08/2019
- Claims filed on 08/08/2019
- Abstracts filed on 08/08/2019
- Drawings filed on 08/08/2019
- Authorization to Permit Access filed on 08/08/2019
- Application Data Sheet (37 CFR 1.76) filed on 08/08/2019

FORM PCT/DO/EO/903 (371 Acceptance Notice)

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

DIAN S GORDON

Telephone: (571) 272-3915

FORM PCT/DO/EO/903 (371 Acceptance Notice)

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/484,728	08/08/2019	Stephen Barbour	91A-3US

CONFIRMATION NO. 1944

130443
Nissen Patent Law
#200, 10328- 81 Ave
Edmonton, AB T6E1X2
CANADA

PUBLICATION NOTICE

OC000000114707659

Title:BLOCKCHAIN MINE AT OIL OR GAS FACILITY

Publication No.US-2020-0051184-A1
Publication Date:02/13/2020

NOTICE OF PUBLICATION OF APPLICATION

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

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

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

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

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

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

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16484728
Filing Date	2019-08-08
First Named Inventor	Stephen Barbour
Art Unit	
Examiner Name	
Attorney Docket Number	91A-3US

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	7542947		2009-06-02	Guyon, et al.	
	2	8156206		2012-04-10	Kiley, et al.	
	3	8483715		2013-07-09	Chen	
	4	9495668		2016-11-15	Juels	

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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	20150261269		2017-06-13	Bruscoe	
	2	20150292303		2015-10-15	Dusseault, et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16484728
	Filing Date	2019-08-08
	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

	3	20150294308		2015-10-15	Pauker, et al.	
	4	20150310424		2015-10-29	Myers	
	5	20160010445		2016-01-14	Harrison, et al.	
	6	20160052814		2016-02-25	Leyendecker, et al.	
	7	20160125040		2016-05-05	Kheterpal, et al.	
	8	20160164672		2016-06-09	Karighattam, et al.	
	9	20160319653		2016-11-03	Reeves, et al.	
	10	20160328713		2016-11-10	Ebrahimi	
	11	20160330031		2016-11-10	Drego, et al.	
	12	20160330035		2016-11-10	Ebrahimi, et al.	
	13	20160362954		2016-12-15	Hansen, et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	2019-08-08
	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

	14	20030196798		2003-10-23	Newman	
	15	20040239499		2004-12-02	Crook	
	16	20050179263		2005-08-18	Johansen, et al.	
	17	20090107671		2009-04-30	Waters, et al.	
	18	20100038907		2010-02-18	Hunt, et al.	
	19	20110199862		2011-08-18	Pop	
	20	20130002443		2013-01-03	Breed, et al.	
	21	20130065669		2013-03-14	Michaelson, et al.	
	22	20130112419		2013-05-09	DeFosse, et al.	
	23	20130166455		2013-06-27	Feigelson	
	24	20130245947		2013-09-19	Samsom, et al.	

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	Application Number	16484728
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	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

	25	20140237611		2014-08-21	Dent	
	26	20140316984		2014-10-23	Schwartz	
	27	20150262139		2015-09-17	Shtylman	
	28	20150294308		2015-10-15	Pauker, et al.	
	29	20150310476		2015-10-29	Gadwa	
	30	20150356524		2015-12-10	Pennanen	
	31	20160109122		2016-04-21	Malm, et al.	
	32	20160112200		2016-04-21	Kheterpal, et al.	
	33	20160214715		2016-07-28	Meffert	
	34	20160218879		2016-07-28	Ferrin	
	35	20160261404		2016-09-08	Ford, et al.	

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	Application Number	16484728
	Filing Date	2019-08-08
	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

	36	20160283920		2016-09-29	Fisher, et al.	
	37	20160300234		2016-10-13	Moss-Pultz, et al.	
	38	20080135238		2008-06-12	Cugnet, et al.	
	39	20160261685		2016-09-08	Chen, et al.	
	40	20140237614		2014-08-21	Irvine	
	41	20150369013		2015-12-24	Weatherhead, et al.	
	42	20150358943		2015-12-10	Zawodniok, et al.	
	43	20160342977		2016-11-24	Lam	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	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	2015077378	WO		2015-05-28	Hanke		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16484728
	Filing Date	2019-08-08
	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

	2	16153967	EP		2016-10-08	Thomas			

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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	WIKI, Mining, accessed 2017-01-19, 4 pages, URL=https://en.bitcoin.it/wiki/Mining.	
	2	International Search Report issued on the corresponding PCT application no. PCT/CA2018/050135, 5 pages.	
	3	WIKI, Google Modular Data Center, accessed 2019-10-05 but available at least as early as 2017-02-08, 2 pages, URL=https://en.wikipedia.org/wiki/Google_Modular_Data_Center.	
	4	BITFURY, Block Box AC Mobile Datacenter, available at least as early as 2017-02-08, 3 pages, screenshots taken from Wayback machine Internet archive, URL=https://web.archive.org/web/20170130043612/http:/bitfury.com/products#blockbox-ac.	
	5	WIKI, Intermodal Container, accessed 2019-10-05 but available at least as early as 2017-02-08, 20 pages, URL=https://en.wikipedia.org/wiki/Intermodal_container 6/.	
	6	WIKI, Sun Modular Datacenter, accessed 2019-10-05 but available at least as early as 2017-02-08, 2 pages, URL=https://en.wikipedia.org/wiki/Sun_Modular_Datacenter.	

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Examiner Signature		Date Considered	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16484728
	Filing Date	2019-08-08
	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

[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	16484728
	Filing Date	2019-08-08
	First Named Inventor	Stephen Barbour
	Art Unit	
	Examiner Name	
	Attorney Docket Number	91A-3US

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	/RobertNissen#64256/	Date (YYYY-MM-DD)	2020-02-05
Name/Print	Robert A. Nissen	Registration Number	64256

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.**

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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.

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(54) **Title**: BLOCK MINING METHODS AND APPARATUS

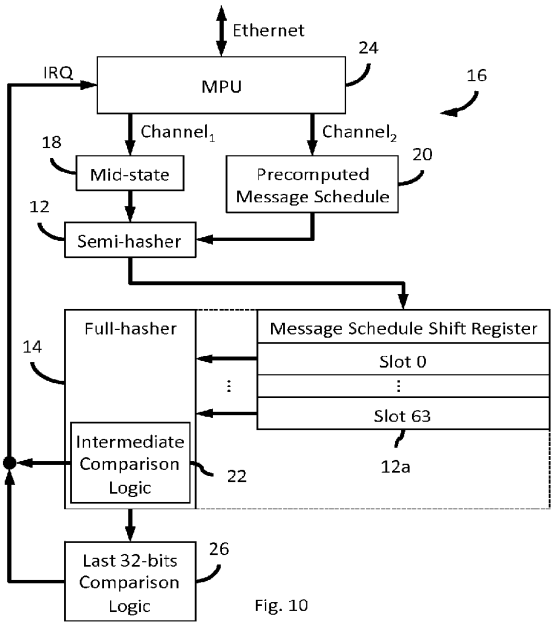


Fig. 10

(57) **Abstract**: Block chain mining methods and apparatus. A mid- state generator develops a plurality, n, of mid-states by selectively varying a portion of the block, and, in particular, the block header. A single message expander develops a message schedule by expanding a message in accordance with a predetermined expansion function; and the message schedule is shared with a plurality, n, of compressors, each developing a result as a function of the message schedule and a respective one of the n unique mid-states in accordance with a predetermined compression function. The compressors can be either rolled core or pipelined core.

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Block Mining Methods and Apparatus

CROSS_REFERENCE TO RELATED APPLICATIONS

[0001] This application is related to Provisional Application Serial No. 61/906,310, filed 19 November 2013 ("Parent Provisional"), the subject matter of which, in its entirety, is expressly incorporated herein by reference, and hereby claims benefit of the filing date thereof pursuant to 37 CFR §1.78(a)(4).

BACKGROUND OF THE INVENTION

1. Field of the Invention.

[0002] The present invention relates to both methods and apparatus for use in *mining* a *block*, *e.g.*, in a *block chain*, and, in particular, to methods and apparatus for use in a *crypto currency* system, such as the *Bitcoin* mining system.

2. Description of the Related Art.

[0003] In general, in the descriptions that follow, we will *italicize* the first occurrence of each special term of art that should be familiar to those of ordinary skill in this art. In addition, when we first introduce a term that we believe to be new or that we will use in a context that we believe to be new, we will **bold** the term and provide the definition that we intend to apply to that term. In addition, throughout this description, we will sometimes use the terms *assert* and *negate* when referring to the rendering of a signal, signal flag, status bit, or similar apparatus into its logically true or logically false state, respectively, and the term *toggle* to indicate the logical inversion of a signal from one logical state to the other. Alternatively, we may refer to the mutually exclusive *boolean* states as logic_0 and logic_1. Of course, as is well known, consistent system operation can be obtained by reversing the logic sense of all such signals, such that signals described herein as logically true become logically false and *vice versa*. Furthermore, it is of no relevance in such systems which specific voltage levels are selected to represent each of the logic states. For convenience of reference, we will use the term "set" to mean a collection of zero, one or more than one items, as the context may require.

[0004] In general, a *decentralized network* can store and reference common information in a block chain. In a typical block chain, each *block* contains units of information commonly called *transactions* that arise roughly at the same time. Using a predefined *protocol*, blocks are *linked* by having their *hash values* inserted into a designated *field* in the next sequential block in the block chain.

[0005] The process of block chain mining is designed to allow the system to come to a consensus in which all *nodes* in the computer network agree to the same block chain. Several block chain systems have been proposed, and some are presently in operation. One of the earliest and, currently, the most widely recognized is the Bitcoin system. According to the Bitcoin protocol, the first *miner* to successfully compute a valid *proof-of-work* for a block *candidate* is entitled to add the block to the block chain (sometimes referred to as the *ledger*), and to *generate* new units of the crypto currency as a reward.

[0006] The proof-of-work for a block consists of a *nonce* value that, when inserted into a designated field in the block, makes the *cryptographic hash value* of the block meet a certain *difficulty target*. Since a *cryptographic hash function* behaves practically as a *random oracle*, no better approach to finding a valid nonce has yet been discovered than simple *trial-and-error*. The mining process is therefore a *stochastic* process. In practice, the chances of a particular miner successfully *solving a block* are, at any particular point in time, proportional to the miner's *hash rate* relative to the hash rate of the whole network.

[0007] As is known, the US National Security Agency ("NSA") has designed and published a set of cryptographic hash functions referred to as *Secure Hash Algorithms* ("*SHA*"). In particular, the Bitcoin protocol applies the *SHA-256*, described in the following pseudocode:

```
**********
Note 1: All variables are 32 bit unsigned integers and addition is
   calculated modulo 2^32

Note 2: For each round, there is one round constant k[i] and one entry
   in the message schedule array w[i], 0 ≤ i ≤ 63

Note 3: The compression function uses 8 working variables, a through h
```

Note 4: Big-endian convention is used when expressing the constants in this pseudocode, and when parsing message block data from bytes to words, for example, the first word of the input message "abc" after padding is 0x61626380

Initialize hash values: (first 32 bits of the *fractional parts* of the square roots of the first 8 primes 2..19)

```
h0 := 0x6a09e667;
h1 := 0xbb67ae85;
h2 := 0x3c6ef372;
h3 := 0xa54ff53a;
h4 := 0x510e527f;
h5 := 0x9b05688c;
h6 := 0x1f83d9ab;
h7 := 0x5be0cd19;
```

Initialize array of round constants: (first 32 bits of the *fractional parts* of the cube roots of the first 64 primes 2..311)

```
k[0..63] :=
   0x428a2f98, 0x71374491, 0xb5c0fbcf, 0xe9b5dba5, 0x3956c25b,
   0x59f111f1, 0x923f82a4, 0xab1c5ed5, 0xd807aa98, 0x12835b01,
   0x243185be, 0x550c7dc3, 0x72be5d74, 0x80deb1fe, 0x9bdc06a7,
   0xc19bf174, 0xe49b69c1, 0xefbe4786, 0x0fc19dc6, 0x240ca1cc,
   0x2de92c6f, 0x4a7484aa, 0x5cb0a9dc, 0x76f988da, 0x983e5152,
   0xa831c66d, 0xb00327c8, 0xbf597fc7, 0xc6e00bf3, 0xd5a79147,
   0x06ca6351, 0x14292967, 0x27b70a85, 0x2e1b2138, 0x4d2c6dfc,
   0x53380d13, 0x650a7354, 0x766a0abb, 0x81c2c92e, 0x92722c85,
   0xa2bfe8a1, 0xa81a664b, 0xc24b8b70, 0xc76c51a3, 0xd192e819,
   0xd6990624, 0xf40e3585, 0x106aa070, 0x19a4c116, 0x1e376c08,
   0x2748774c, 0x34b0bcb5, 0x391c0cb3, 0x4ed8aa4a, 0x5b9cca4f,
   0x682e6ff3, 0x748f82ee, 0x78a5636f, 0x84c87814, 0x8cc70208,
   0x90befffa, 0xa4506ceb, 0xbef9a3f7, 0xc67178f2;
```

Pre-processing:

```
append the bit '1' to the message;
append k bits '0';
   where k is the minimum number >= 0 such that the resulting message
      length (modulo 512 in bits) is 448
```

```
append length of message;
   (without the '1' bit or padding), in bits, as 64-bit big-endian
      integer (this will make the entire post-processed length a
      multiple of 512 bits)

Process the message in successive 512-bit chunks:
break message into 512-bit chunks;
for each chunk:
{
   create a 64-entry message schedule array w[0..63] of 32-bit words;
      (The initial values in w[0..63] don't matter, so many
         implementations zero them here)
   copy chunk into first 16 words w[0..15] of the message schedule
      array;

   Expand the first 16 words into the remaining 48 words w[16..63] of
      the message schedule array:
   for i from 16 to 63:
      s0 := (w[i-15] rightrotate 7) xor (w[i-15] rightrotate 18) xor
         (w[i-15] rightshift 3);
      s1 := (w[i-2] rightrotate 17) xor (w[i-2] rightrotate 19) xor
         (w[i-2] rightshift 10);
      w[i] := w[i-16] + s0 + w[i-7] + s1;

   Initialize working variables to current hash value:
   a := h0;
   b := h1;
   c := h2;
   d := h3;
   e := h4;
   f := h5;
   g := h6;
   h := h7;

   Compression function main loop:
   for i from 0 to 63:
   {
      S1 := (e rightrotate 6) xor (e rightrotate 11) xor (e rightrotate
         25);
```

```
      ch := (e and f) xor ((not e) and g);
      temp1 := h + S1 + ch + k[i] + w[i];
      S0 := (a rightrotate 2) xor (a rightrotate 13) xor (a rightrotate
         22);
      maj := (a and b) xor (a and c) xor (b and c);
      temp2 := S0 + maj;
      h := g;
      g := f;
      f := e;
      e := d + temp1;
      d := c;
      c := b;
      b := a;
      a := temp1 + temp2;
   }

   Add the compressed chunk to the current hash value:
   h0 := h0 + a;
   h1 := h1 + b;
   h2 := h2 + c;
   h3 := h3 + d;
   h4 := h4 + e;
   h5 := h5 + f;
   h6 := h6 + g;
   h7 := h7 + h;
}

Produce the final hash value (big-endian):
digest := hash := h0 append h1 append h2 append h3 append h4 append h5
   append h6 append h7
**********
```

[0008] Hereinafter, for convenience of reference, we may refer to aspects of our invention using the terminology set forth above in the pseudocode. Also, by way of example, we will focus our disclosure on the Bitcoin protocol, although we recognize that other crypto currency systems may benefit from our invention.

[0009] Many hash functions, including the *SHA-1*, *SHA-2* and *RIPEMD* families, share a similar scheme with SHA-256. Each applies an *expansion function* (sometimes referred

to as an *expansion operation*) adapted to *expand* an input *message* into a *message schedule*, and then applies a *compression function* (sometimes referred to as a *compression operation*) adapted to *compress* the message schedule into a hash *value* or *result* (sometimes referred to as the *message digest* or simply *digest*). Typically, the compression function is *recursive*, compressing one *word* of the message schedule per *round*. The recursive nature of these functions lends itself to known *loop unrolling* techniques and, when applied to hardware implementations, results in a classic *pipelined* configuration of *computational elements*.

[0010] Usually, when a hash is computed within Bitcoin, it is computed twice, *i.e.*, a SHA-256 hash of a SHA-256 hash (sometimes referred to as a *double-SHA*, or simply SHA^2). Most of the time only SHA-256 hashes are used, for example when hashing transactions and *block headers*. However, RIPEMD-160 is also used for the second hash when a shorter hash digest is desirable, *e.g.*, when hashing a *public key* to obtain a *Bitcoin address*.

[0011] Block chain mining is, by design, competitive in nature. The monetary reward is proportional to the number of blocks *solved*, which is in turn proportional to the hash rate relative to the hash rate of the entire network. As competition has increased, miners are aggressively seeking even small improvements in hash rate. One known approach to improve hash rate is to *scatter* the *hash search* across the greatest number of *hash engines*, each adapted to independently *search* a respective portion of the entire *nonce-space* for hashes that *satisfy* (*i.e.*, are below) the required difficulty target.

[0012] Often, when a hash is computed within Bitcoin, the message being hashed is of a fixed length. This is the case for example for block *headers* (80 *bytes*) and whenever a hash value (32 bytes) is itself being hashed. Hash values are being hashed in all applications of double-SHA. In the formation of a *Merkle tree* hash value pairs (64 bytes) arranged in a *tree data structure* are being hashed. In general, hash engines adapted to hash fixed length messages may be optimized differently than are hash engines adapted to hash arbitrary length messages.

[0013] When implementing a hash engine in an *application specific integrated circuit* ("*ASIC*"), the key design goals are to improve power, performance and area. When many

messages of the same short length have to be hashed, a pipelined implementation of a hash *core* is possible. By way of example, Fig. 1 shows one block of such a PRIOR ART pipeline. In a typical ASIC, several such pipeline blocks are instantiated and adapted to operate, either in *parallel* or *serially*, under the control of a *central control unit,* which may be a conventional *microprocessor unit* ("*MPU*") or a special controller (not shown) instantiated on the same ASIC.

[0014] In block chain mining, many messages (blocks) are being hashed that differ only in the last *chunk* (*i.e*, the portion containing the nonce). For that specific type of application, the *mid-state* of the *compressor* (*i.e.*, the hardware component that performs the compression function) can be pre-computed as far as it does not depend on the nonce. Then, for the last application of the compressor that does depend on the nonce, the pipelined core 10 as in Fig. 1 may be employed. In Fig. 1, we have used conventional notation to indicate bus widths, with units expressed as 32-bit *double-words* ("*dwords*"). Sometimes, depending on the context, the compressor 14 may be referred to as a *semi-hasher* and the combination of the expander 12 and the compressor 14 as a *full-hasher*. For the purposes of our invention, we submit that the core 10 can be instantiated in either a pipelined or *rolled* form.

[0015] We have illustrated in Fig. 2 the basic hardware architecture of a PRIOR ART *rolled core* 10'. Typically, in such an architecture, approximately 67 cycles are required to compute one SHA-256 round, comprising 64 computation cycles plus a few additional cycles to load the registers with initial values. Often, the *read-only-memory* ("*ROM*") of *constants* is shared among several cores 10'. In general, a PRIOR ART special purpose rolled core 10' may be conceptualized as illustrated in Fig. 3 wherein the hash computational hardware is depicted as a *cloud* of *combinational logic*. A more highly structured, PRIOR ART SHA^2 pipelined core 10 is illustrated by way of example in Fig. 4. In Fig. 5, we have illustrated a high-level representation of a typical Bitcoin SHA^2 engine 16.

[0016] Shown in Fig. 6 is the format of a Bitcoin Block Header wherein the indicated *field sizes* are expressed in 8-bit bytes. As can be seen, at *offset* 36, the 32-byte Merkle Root field spans the boundary between Block[0] (sometimes referred to simply as "B_0")

and Block[1] ("B_1") of the block header. By way of example, we have illustrated in Fig. 7 a 3-level Merkle tree having a *leaf* set comprising 4 *transactions*, although it will be recognized that a typical Merkle tree may have additional *hierarchical hash levels* depending on the number of transactions being hashed. In Fig. 8 we have shown, for convenience of reference, a typical 3-block sequence within a Bitcoin block chain, wherein each block comprises a block header (see, Fig. 6) and a respective set of transactions (in *clear text* to facilitate *block browsing*). In situations where the number of available transactions is less than a *power-of-two*, *padding*, *e.g.*, duplicate or dummy transactions, is added at the leaf level to complete the power-of-two tree structure. In accordance with the Bitcoin protocol, the first transaction of every block is always a *generation* (or *coinbase*) transaction *generated* by the miner who added the block to the chain.

[0017] As we explained in our Provisional Application, it has been proposed to partition the 4-byte *Version* field in the block header (see, Fig. 6) and use, *e.g.*, the high 2-byte portion as additional nonce range. Alternatively, the Bitcoin specification defines an *extraNonce* field in the format for the *coinbase* or *generation* transaction (see, Fig. 16b). However, the Bitcoin specification recognizes that incrementing the extraNonce field entails recomputing the Merkle tree, as the coinbase transaction is the left most leaf node. In this approach, each time the extraNonce is incremented, a full Merkle root is generated, thus requiring the full block header to be reprocessed.

[0018] One problem that we perceive with current hardware platform designs is the requirement that each hash core be adapted to perform the full SHA-256 independently of all of the other hash cores in the hardware instantiation. What is needed is a method and apparatus that allows a single expander instant to be shared by a plurality of compressor instants.

BRIEF SUMMARY OF THE INVENTION

[0019] In one embodiment of our invention, we provide a method for mining a block comprising a block header, as a function of a selected hash function applied on the block header, the selected hash function comprising an expansion operation and a compression operation. In accordance with our method, we first develop a plurality, m, of mid-states,

each as a function of selectively varying a selected first portion of the block header. We then perform the expansion operation on a selected second portion of the block header to produce a message schedule. Finally, for each of the m mid-states, we perform the compression operation on the mid-state and the message schedule, to produce a respective one of m results.

[0020] In one other embodiment, we provide apparatus configured to perform our block mining method.

[0021] In yet another embodiment, our method for block mining can be embodied in a computer readable medium including executable instructions which, when executed in a processing system, causes the processing system to perform the steps of our method.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0022] Our invention may be more fully understood by a description of certain preferred embodiments in conjunction with the attached drawings in which:

[0023] Fig. 1 illustrates, in block diagram form, a PRIOR ART special purpose SHA pipeline;

[0024] Fig. 2 illustrates, in block diagram form, a PRIOR ART special purpose SHA rolled core;

[0025] Fig. 3 illustrates, in block diagram form, another PRIOR ART special purpose SHA rolled core;

[0026] Fig. 4 illustrates, in block diagram form, a PRIOR ART Bitcoin SHA^2 hash engine having a pipelined core;

[0027] Fig. 5 illustrates, in block diagram form, a PRIOR ART Bitcoin SHA^2 hash engine having either a rolled core or a pipelined core;

[0028] Fig. 6 illustrates, in tabular form, the format of a Bitcoin Block Header;

[0029] Fig. 7, illustrates, in block diagram form, a multi-tier Merkle tree as employed in the Bitcoin protocol;

[0030] Fig. 8 illustrates, in block diagram form, the general format for Bitcoin blocks comprising a block chain;

[0031] Fig. 9 illustrates, in block diagram form, a Bitcoin SHA^2 hash engine constructed in accordance with our invention as disclosed in our Provisional Application;

[0032] Fig. 10 illustrates, in block diagram form, one possible hardware implementation in accordance with our invention as disclosed in our Provisional Application;

[0033] Fig. 11 illustrates, in logic flow diagram form, one possible method for operating the embodiment of Fig. 10, as also disclosed in our Provisional Application;

[0034] Fig. 12 illustrates, in block diagram form, one possible parallel, **message schedule sharing** embodiment in accordance with our invention as disclosed in our Provisional Application;

[0035] Fig. 13 illustrates, in block diagram form, one possible *cascaded*, message schedule sharing embodiment in accordance with our invention;

[0036] Fig. 14 illustrates, in block diagram form, one alternate parallel, pipelined **message schedule pre-computation** embodiment in accordance with our invention;

[0037] Fig. 15, comprising Fig. 15a and Fig. 15b, illustrates, in block diagram form, possible message schedule pre-computation engines adapted for use, for example, in Fig. 14;

[0038] Fig. 16, comprising Fig. 16a and Fig. 16b, illustrates, in block diagram form, several possible forms for the multi-tier Merkle tree of Fig. 7;

[0039] Fig. 17 illustrates, in flow diagram form, one possible method for generating a plurality of Merkle roots in accordance with our invention;

[0040] Fig. 18 illustrates, in block diagram form, one possible cascaded, message schedule sharing embodiment, having rolled cores, in accordance with our invention; and

[0041] Fig. 19 illustrates, in block diagram form, a message schedule pre-computation embodiment, having rolled cores, in accordance with our invention.

[0042] In the drawings, similar elements will be similarly numbered whenever possible. However, this practice is simply for convenience of reference and to avoid unnecessary proliferation of numbers, and is not intended to imply or suggest that our invention requires identity in either function or structure in the several embodiments.

DETAILED DESCRIPTION OF THE INVENTION

[0043] Fig. 9 illustrates, in high-level form, a Bitcoin SHA^2 hash engine 16 constructed in accordance with our invention as disclosed in our Provisional Application. In Fig. 10, we present a basic implementation of our invention as we disclosed in our Provisional Patent. The preferred embodiment is instantiated in the form of an ASIC that instantiates a hash engine 16' containing a selected plurality, *e.g.*, 200, SHA-256 semi-hashers 12, and a corresponding plurality of full SHA-256 hashers 14. Each semi-hasher 12 is pipelined with a respective full-hasher 14. Each hasher pipeline, which combines one semi-hasher 12 with one full-hasher 14, outputs one SHA^2 result per *clock tick*. Each semi-hasher 12 has a 32-byte mid-state register 18 which contains a pre-computed mid-state, and a 64*4 byte pre-computed message schedule register 20 which contains a pre-computed message schedule; and all SHA rounds are unrolled and implemented in hardware. As is conventional, each full-hasher 14 contains the message schedule creation logic to derive the message schedule from the input block on each clock tick; and, also, rounds are unrolled. A message schedule shift register 12a is adapted to perform similar to an expander pipeline to develop the message schedule of an input block sequentially in a 64-deep *push-down stack* of 16 dwords *sliding windows* (sometimes referred to as *slots*), where each new dword of the message enters at the top and the oldest dword is removed at the bottom. In operation, each sliding window is pushed down to the next-deeper slot to follow the hash round corresponding with the slot. At round 61 of the full-hasher 14, we provide a special intermediate comparison logic module 22 that checks for a solution to the block before all 64 rounds are performed. If the solution is found, an *interrupt* ("*IRQ*") is *raised*; optionally, all full-hashers 14 may be allowed to continue searching for additional solutions, or may be stopped to conserve power. An external *microprocessor* ("*MPU*") 24 handles the exception, reads the full-hasher 14 outputs, and finds the one that solved the block. Further, we provide a last-32-bits checker 26 to facilitate reuse of the hasher pipeline for the pre-computation.

[0044] In accordance with one embodiment of our invention, we propose directly to selectively vary the 28-byte portion of the Merkle root that lies in Block[0] (see, Fig. 6). Our method requires that the miner first perform a **preparation stage** where many different valid Merkle roots are constructed. However, in contrast with the usual

approach, our goal is to find a number of candidate Merkle roots that end with the same 4-byte pattern. For example, one way is to select a predetermined, fixed pattern (*e.g.*, 4 zero bytes). Another way is to store the Merkle root candidates for each pattern until enough candidate roots ending with a desired pattern are found.

[0045] The functional flow of operation of our hash engine 16', as we described in our Provisional Application, is illustrated in Fig. 11. In pseudocode form (with indentation indicating a *for-loop* structure), here is how it works:

```
**********
1. Pre-compute s mid-states MS0,..,MSs-1 by applying the first chunk
processing of SHA to a block header modified by setting the Merkle-
roots field to each of the s Merkle-roots MR0,..,Mrs-1.

2. Create B1 with the first 32 bits of B1 set to the fixed pattern that
all MR_i have in common in their respective last 4 bytes. Set the other
fields of B1 ("bits" and "time") to the appropriate values.

3. For each nonce v,

   3.1. Store the nonce in B1 and pre-compute the message schedule Wv for
   B1.

   3.1. For each i from 0 to s-1:

      3.1.1. Complete the mid-state MSi to a full SHA execution using
      the pre-computed message schedule Wv to obtain the intermediate
      digest Ti,v.

      3.1.2. Apply the second SHA operation to Ti,v to obtain the double-
      SHA digest Di,v.

      3.1.3. Compare Di,v with target (if last round optimization is in
      use, the comparison is done within the second SHA execution
      engine).
**********
```

[0046] To quickly enumerate many valid candidate roots, one way to construct them is by incrementing the extraNonce field and recomputing the parent node hashes up the tree to the root node. One other way is by rearranging the sub-trees of the Merkle tree by

swapping child nodes (*e.g.*, left with right), and recomputing parent nodes until the root node; this approach could include *permuting* the transaction leafs. Each time a new candidate root is computed, it's checked against the desired pattern, and, if it does not match, the candidate root is discarded, otherwise it is stored. As we noted in our Provisional Application, this technique requires the miner to perform approximately s*2^32*log2(Q) SHA^2 hash digests to obtain s elements of equal ending, when there are Q transactions to include in the Merkle-tree.

[0047] As explained in our Provisional Application, we propose to achieve greater performance by combining two sets of pre-generated Merkle sub-trees (although a dynamically generated Merkle sub-tree can be combined, we have found this to be generally worse). Our preparation stage is performed in three steps:

1. In the first step of our preparation stage, we develop K_1 node hashes by selectively rearranging the set of transactions in the Merkle-tree, or, perhaps, by choosing different sets of transactions from the pool of all pending transactions. This can be accomplished in approximately $(K_1+1)*\log2(\#Q_1)$ SHA^2 operations, where Q_1 is a set of transaction hashes and $\#Q_1$ is the number of transactions hashes in the set (*i.e.*, leaf nodes), since once a tree for Q_1 transactions has been built, then a new root can be obtained by swapping child nodes, and computing each parent node requires on average $\log2(Q_1)$ SHA^2 hash digests. Only the parent node hashes need to be saved, and the actual trees can be later removed from memory.

2. In the second step of our preparation stage, we develop a set of K_2 parent node hash digests of a set of node sub-trees, where the set of transactions is Q_2 and the number of transactions (leaf nodes) is $\#Q_2=\#Q_1$ (as noted above, this is always possible since Bitcoin Merkle roots use duplicate transaction hashes to fill empty nodes of the tree). Note that the sets Q_1 and Q_2 do not *intersect*, and any ordering of transactions created by the *concatenation* of an ordering of Q_1 with any ordering of Q_2 must be a valid ordering of transactions. Note, also, that almost all possible orders of the Q_1 transactions are generally valid since most miners do not generate blocks which have transactions that depend on other transactions in the block (the only exception is that the generation transaction is always the first).

For Q_1, there are $(\#Q_1\text{-}1)!$ number of possible candidate roots of the left sub-trees (there are 3628800 possible orderings).

For Q_2 , for simplicity, we can assume that there are no repeated transaction hashes (*i.e.*, $\#Q_1+\#Q_2$ is a power of two). It follows therefore that there are $(\#Q_2)!$ number of possible candidate roots of the right sub-trees. If we take $\#Q_1=\#Q_2=11$, then there are at least 2^46 possible candidate roots that can be computed easily by combining an element from the left set with an element from the right set. Note that K_1 and K_2 need not to be that large, and can represent a small subset of the possible orderings, and use higher values of $\#Q_1$ and $\#Q_2$.

3. In the third step of our preparation state (which is generally performed, *e.g.*, by our hash engine 16'), the hashes of one parent of the first set are iteratively combined with a parent of the second set (one left node with a right node), and then SHA^2 hashed to obtain the root node hash. Each combination requires only obtaining 2 hashes from tables and performing the SHA^2 operations.

[0048] Shown in Fig. 12 is a core 10, adapted for use in the system of Fig. 9, comprising one expander 12 adapted to share the same message schedule with a pair of synchronously operating compressors 14a and 14b. As explained above, each of the compressors 14 starts with a unique mid-state generated using, *e.g.*, our candidate root generation process. As the hash process progresses synchronously downward through the compressors 14, the message schedule words flow in parallel downward through the expander 12. Upon completion, each compressor 14 delivers a respective, unique Out State. As in our basic architecture, the mid-states remain constant over a full nonce range, whereas the nonce inside the message schedule words increments at the full pipeline clock rate. In distinct contrast to a conventional architecture, our hash engine 16' requires only a single, shared expander 12, thereby significantly reducing not just total system hardware but power consumption.

[0049] Shown in Fig. 13 is a generic, cascaded core 10, adapted for use in the system of Fig. 9, comprising one expander 12 adapted to share the same message schedule with a plurality of synchronously operating compressors 14a-14b. In this core 10, the several compressors 14 are connected in cascade, with each message schedule element being

passed sequentially from compressor to compressor, one delay interval (suitable for the specific hardware implementation) per compressor. Each compressor 14 starts with a unique mid-state and, upon completion, delivers a respective unique Out State; however, the Out States corresponding to the same message are delivered sequentially over time one delay interval apart. Note that this arrangement comprises a carefully coordinated 2-dimensional pipeline with work flowing from top-down and left-right. In operation, every cycle, all of the compressors 14 produce a respective Out State, but for different messages.

[0050] In Fig. 14 we have illustrated a generic, cascaded form of our message schedule pre-computation method, wherein the hash engine 16 comprises a mid-state generator 28 adapted dynamically to generate unique mid-states for each of the plurality of compressors 14, and a 64-stage delay FIFO 30 adapted to delay delivery of the respective mid-states to the final stage of the corresponding compressors 14. The mid-state generator 28 must develop a new mid-state every compressor pipe clock, with each mid-state being passed down the compressor chain at that same pipe clock rate. In this embodiment of our message schedule pre-computation hash engine 16, the message schedule words, W_0-W_{63}, are dynamically developed by a suitable message schedule pre-computation engine 32, examples of which we have shown in Fig. 15. In hash engine 16, both the message schedule words and the nonce are constant for a relatively long time. In the embodiment shown in Fig. 15a, the output words are stored in a set of 64 message schedule registers 34 associated with each compressor 14. Although we have illustrated in Fig. 15a a single, shared rolled message expander 32a, each compressor 14 has a local rolled message expander 32a (not shown). In the alternate embodiment shown in Fig. 15b, each compressor 14 has a cloud of combinational logic 32b associated therewith adapted to dynamically generate the message schedule words; there is, therefore, no need for the registers 34 in this embodiment. Since the message schedule registers 34 update relatively infrequently, there should be sufficient time for the deep logic 32b to resolve.

[0051] In Fig. 16a, we have illustrated, for convenience of reference, the structure of a simple, 3-level binary Merkle tree having 4 leaf nodes, *i.e.*, $\text{Transactions}_{[1::4]}$. In accordance with our invention, we seek to produce as many candidate root hashes as

possible, and then to identify and store those that match in the last dword. In pseudocode form, one approach we refer to as **divide-and-conquer** ("**D&C**") works like this:

```
**********
D&C Algorithm:
Input: Q = set of 2^n transactions (i.e., the leaves of the tree).
Output: L = list of k root node hash values.
1. Divide the set of leaves into two sets Q1, Q2 of size 2^(n-1);
2. Produce a list L1 of hash digests where each element is the root
   node of a Merkle tree built from Q1 by permuting nodes of the tree
3. Produce a list L2 of hash digests where each element is the root
   node of a Merkle tree built from Q2 by permuting nodes of the tree
   3.1. For all x1 in L1:
      3.1.1. For all x2 in L2:
         3.1.1.1. Compute x = SHA2( x1 || x2) and append to L;
4. Return the list L comprising #L1*#L2 roots.
**********
```

Notes:

1) This flow is illustrated in Fig. 17. In the inner loop step 2.1.1, we denote the `append` operation using a "::" symbol.

2) Our basic transaction swapping mechanism is illustrated by way of example in Fig. 16a, wherein Transaction_3 in the right sub-tree, Q2, has been swapped with Transaction_4 in the right sub-tree, Q2.

3) In Fig. 16b, we have emphasized that the Generation transaction must always be the left-most transaction. Thus, in step 1 of our D&C Algorithm, the Generation transaction is constrained to remain in Q1.

4) Since k1, k2 can be relatively small (requiring on the order of about 1M list elements), we prefer to implement all but the outer recursion of our D&C Algorithm, *i.e.*, step 2, in the form of a software module residing in the MPU 24. Once developed, L1 and L2 may be forwarded to a pipeline of hash cores 10 to produce the root hashes and then search the list L for roots that satisfy our criteria (on the order of about 1T list elements).

[0052] One alternate approach for quickly developing a set of candidate root hashes is to increment the extraNonce field that is available for use in every Generation transaction

(see, Fig. 16b). Since the extraNonce field is variable length from 2 to 100 bytes, a very large pool of candidate root hashes can be easily and rapidly generated simply by using the extraNonce field. Although it has heretofore been proposed to use the extraNonce field to increase the effective nonce range for mining operations, we are not aware of any proposal that the resulting set of root hashes be **filtered** using a predetermined **filter function** specially adapted to identify those in which the last 4 bytes match a given criteria, *e.g.*, all zeros or any other given value as we have disclosed in our Provisional Application. The essential benefit of our approach is that only B_0 is affected, allowing the message schedule of B_1 to be pre-computed. The end goal, remember, is to facilitate our two primary mechanisms: message schedule sharing and message schedule pre-computation.

[0053] In Fig. 18, we have illustrated how we can adapt the rolled core architecture in accordance with our invention to employ our message schedule sharing methodology. In the illustrated core 10', the message schedules developed by a single message expander 12 are applied, in parallel, to a plurality of synchronously operating compressors 14. As in the embodiment of Fig. 12, each of the compressors 14 are initialized with different mid-states; this is effective since new mid-states are required relatively infrequently, generally after the nonce range has been exhausted.

[0054] In Fig. 19, we have illustrated how we can adapt the rolled core architecture in accordance with our invention to employ our message schedule pre-computation methodology. In the illustrated core 10', the pre-computed messages are developed by a single message expander 12, and applied, in parallel, to a plurality of cascaded compressors 14. As in the embodiment of Fig. 14, the generated mid-states are cascaded down through a respective set of mid-state registers, via a bus operating at a frequency of approximately core frequency / 67. In this embodiment, since the message schedule updates relatively infrequently, we can add the constants and store the pre-computed sums in the register file.

[0055] Although we have described our invention in the context of particular embodiments, one of ordinary skill in this art will readily realize that many modifications may be made in such embodiments to adapt either to specific implementations. In the

future, if other parts of the Bitcoin block header are made available as expanded nonce space, such as the first 32-bits of the *previous block hash*, then our methods and apparatus can also make use of this extra nonce space for creating the set of mid-states required by our invention.

[0056] Thus it is apparent that we have provided an improved method and apparatus for mining block chains. In particular, we submit our new methods and apparatus allow a single expander instant to be shared by a plurality of compressor instants. Further, we submit that our method and apparatus provides performance generally superior to the best prior art techniques.

CLAIMS

What we claim is:

1. A method for mining a block comprising a block header, as a function of a selected hash function applied on the block header, the selected hash function comprising an expansion operation and a compression operation, the method comprising the steps of:

[1] developing a plurality, m, of mid-states, each as a function of selectively varying a selected first portion of the block header;

[2] performing the expansion operation on a selected second portion of the block header to produce a message schedule; and

[3] for each of the m mid-states, performing the compression operation on the mid-state and the message schedule, to produce a respective one of m results.

2. The method of claim 1 wherein the first portion of the block header comprises the first 4 bytes of the block header.

3. The method of claim 1 wherein the first portion of the block header comprises a digest of a transaction.

4. The method of claim 3 wherein a generation transaction comprises one of the transactions; and wherein step [1] is further characterized as varying the generation transaction.

5. The method of claim 3 wherein step [1] is further characterized as varying a selected portion of a selected transaction.

6. The method of claim 3 wherein step [1] is further characterized as varying an order of a plurality of transactions.

7. The method of claim 1 wherein the first portion comprises a root of a tree data structure.

8. The method of claim 7 wherein the tree data structure comprises a Merkle tree.

9. The method of claim 7 wherein step [1] is further characterized as comprising the steps of:

[1.1.1] selecting a left sub-tree hash from a first plurality of candidate sub-tree hashes;

[1.1.2] selecting a right sub-tree hash from a second plurality of candidate sub-tree hashes; and

[1.1.3] developing the root of the tree data structure from the left sub-tree hash and the right sub-tree hash.

10. The method of claim 1 wherein step [1] is further characterized as comprising the steps of:

[1.1] developing a candidate block header by varying the first portion of the block header;

[1.2] applying a filter function to the candidate block header, and:

[1.2.1] if the candidate block header fails the filter function, discarding the candidate block header; but

[1.2.1] otherwise, developing a mid-state as a function of the candidate block header; and

[1.3] repeating steps [1.1] through [1.2] to develop a plurality, m, of mid-states, each as a function of a respective candidate block header.

11. The method of claim 10:

wherein, in step [1.1], the first portion of the candidate block header comprises 28 bytes and a second portion of the candidate block header comprises 4 bytes; and

wherein, in step [1.2.1], the filter function is further characterized as selecting for discard a candidate block header depending on the second portion.

12. The method of claim 1 wherein step [2] is further characterized as:

[2] performing the expansion operation on the block header to produce a message schedule comprising an ordered sequence of message schedule elements;

and wherein step [3] is further characterized as:

[3] for each of the m mid-states, performing the compression operation on the sequence of message schedule elements to produce a respective one of m results.

13. The method of claim 1 further comprising the steps of:

[4] selectively developing a modified block header by varying a selected portion of the block; and

[5] selectively repeating steps [2] through [4].

14. A method adapted for use in mining a block to create a root of a Merkle tree, the tree having a plurality of nodes, the method comprising the steps of:

[1] creating a plurality of candidate sub-tree hashes by rearranging a selected set of the nodes;

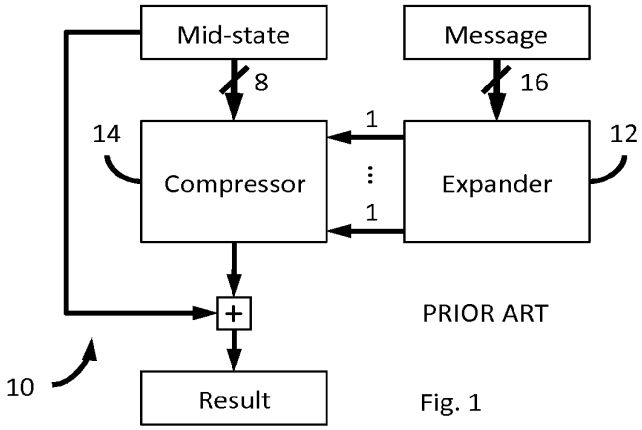
[2] selecting a left sub-tree hash from a first plurality of candidate sub-tree hashes;

[3] selecting a right sub-tree hash from a second plurality of candidate sub-tree hashes; and

[4] developing the root of the tree data structure from the left sub-tree hash and the right sub-tree hash.

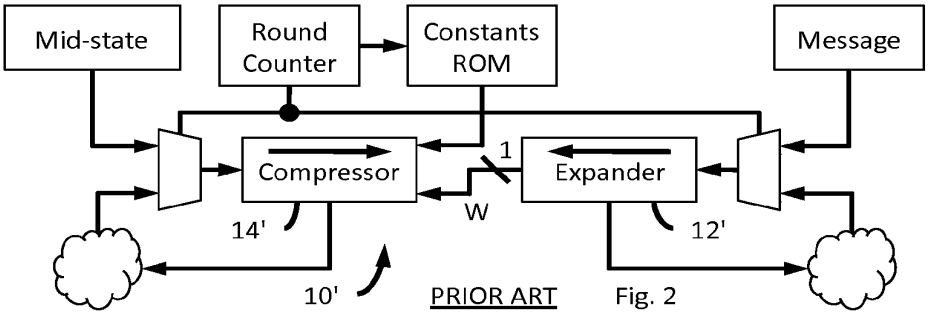
15. Apparatus configured to perform the method of any preceding claim.

16. A computer readable medium including executable instructions which, when executed in a processing system, causes the processing system to perform the steps of a method according to any one of claims 1 to 14.



PRIOR ART

Fig. 1



PRIOR ART Fig. 2

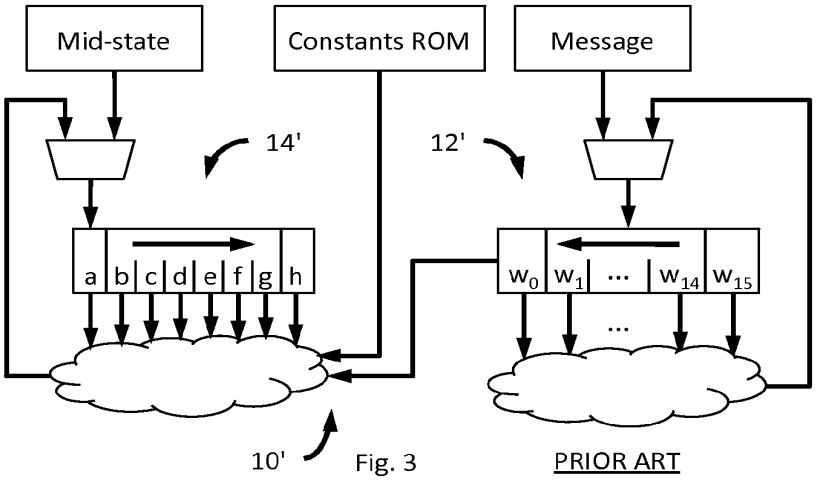


Fig. 3 PRIOR ART

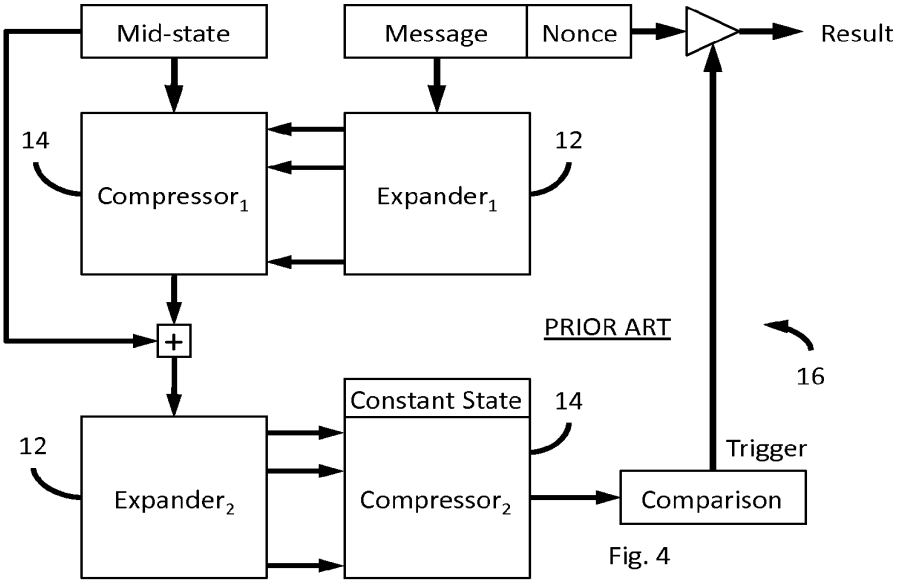


Fig. 4

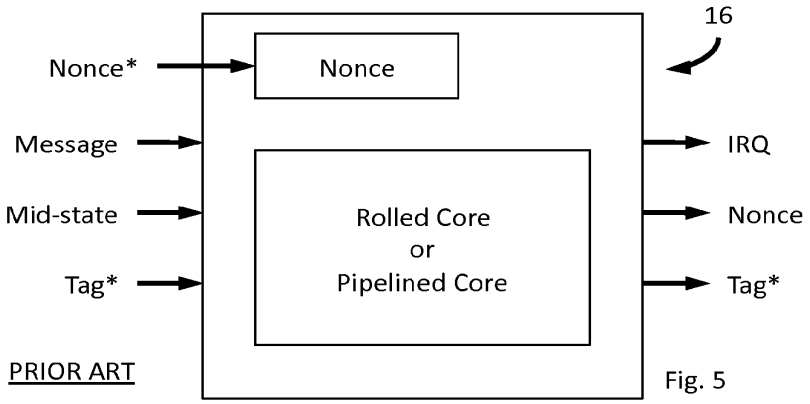


Fig. 5

Block[0]				Block[1]		
Version	**Hash**	**Merkle**		**Timestamp**	**Target**	**Nonce**
4	32	28	4	4	4	4

Fig. 6: Block Header PRIOR ART

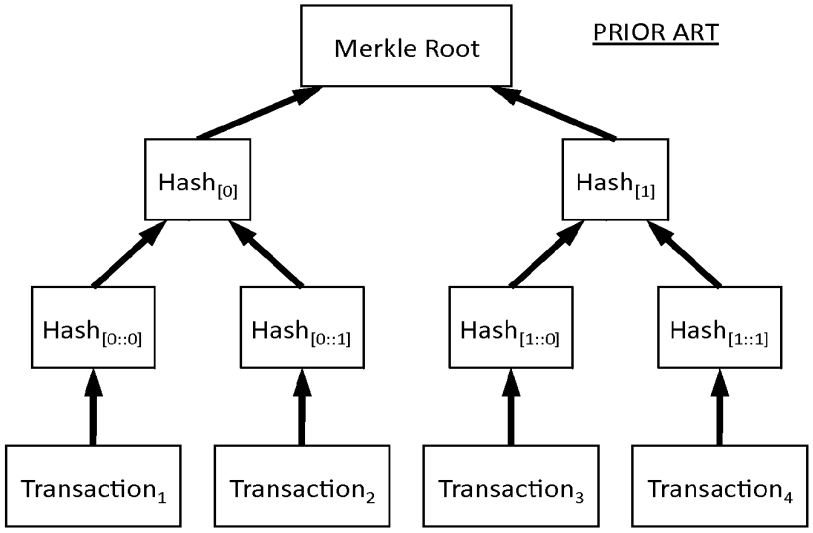


Fig. 7

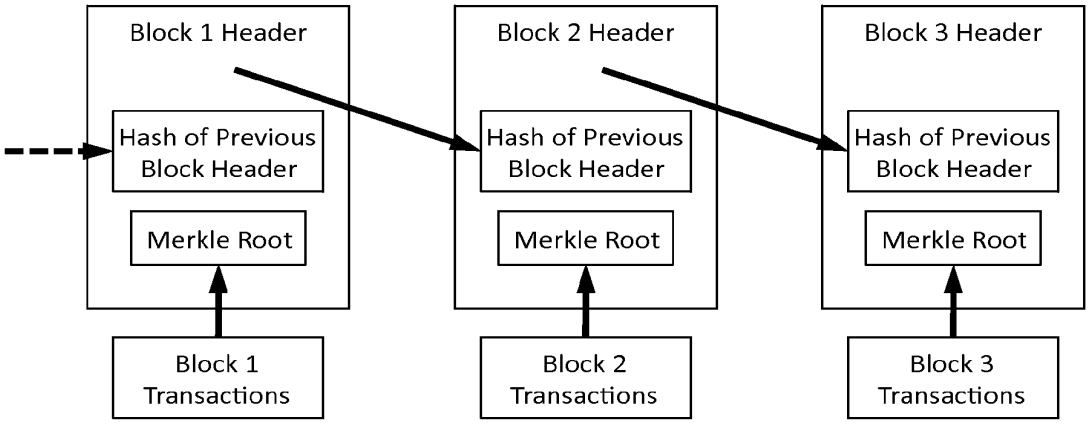


Fig. 8 PRIOR ART

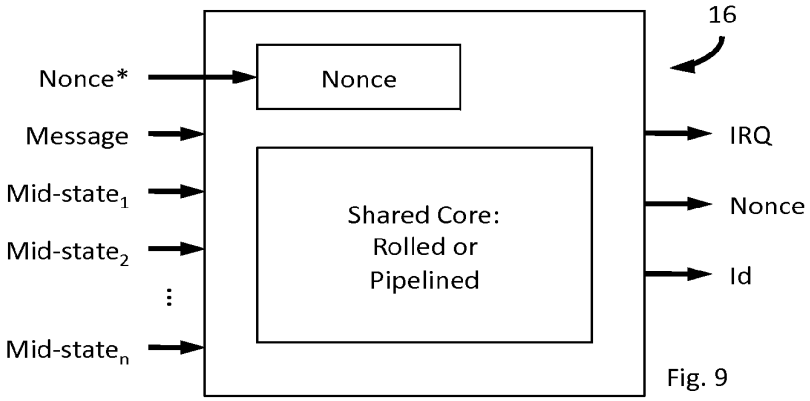

16
Nonce*
Nonce
Message
IRQ
Mid-state1
Shared Core:
Rolled or
Pipelined
Nonce
Mid-state2
Id
Mid-staten

Fig. 9

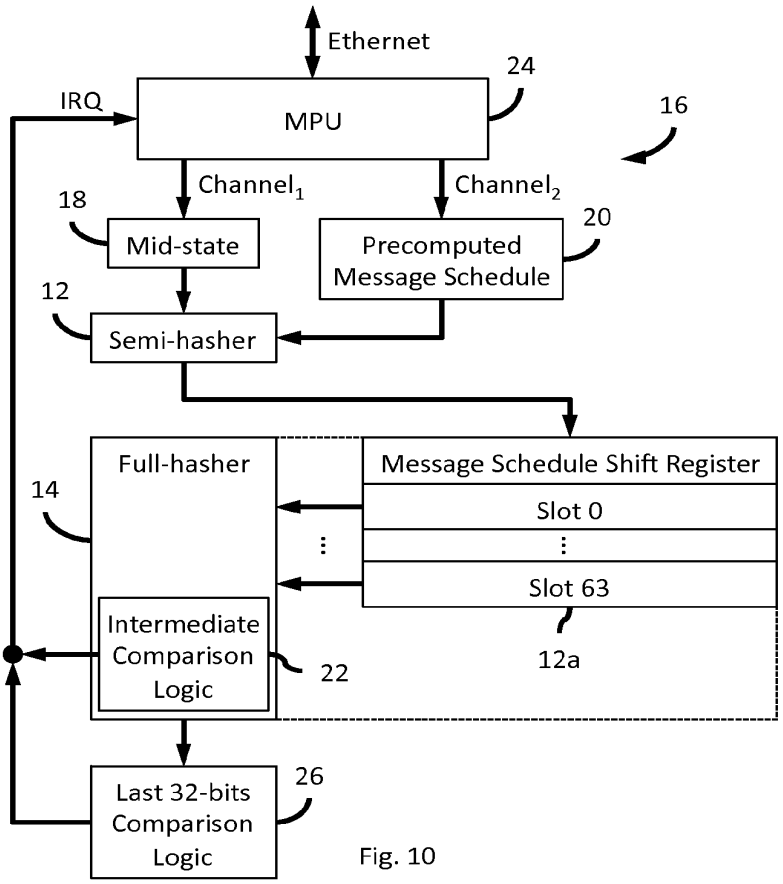

Ethernet
24
IRQ
MPU
16
Channel1
Channel2
18
20
Mid-state
Precomputed
Message Schedule
12
Semi-hasher
Full-hasher
Message Schedule Shift Register
14
Slot 0
Slot 63
Intermediate
Comparison
Logic
22
12a
Last 32-bits
Comparison
Logic
26

Fig. 10

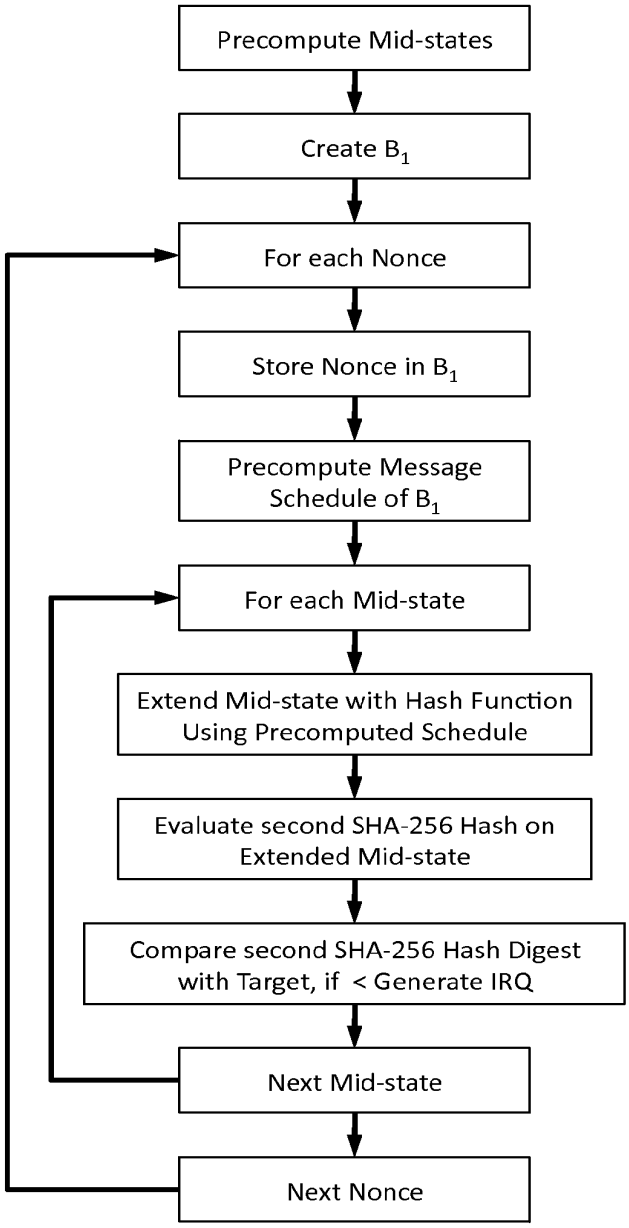

Precompute Mid-states
Create B_1
For each Nonce
Store Nonce in B_1
Precompute Message Schedule of B_1
For each Mid-state
Extend Mid-state with Hash Function Using Precomputed Schedule
Evaluate second SHA-256 Hash on Extended Mid-state
Compare second SHA-256 Hash Digest with Target, if < Generate IRQ
Next Mid-state
Next Nonce

Fig. 11

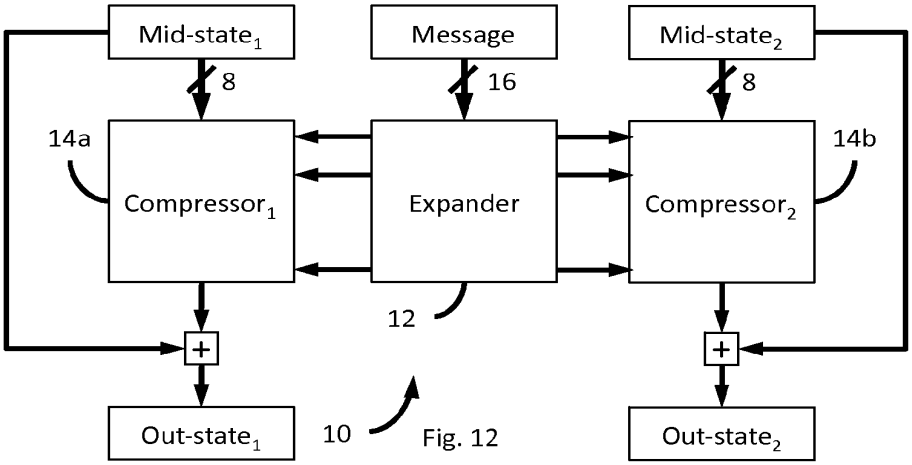

Mid-state1
Message
Mid-state2
8
16
8
14a
14b
Compressor1
Expander
Compressor2
12
Out-state1
10
Out-state2

Fig. 12

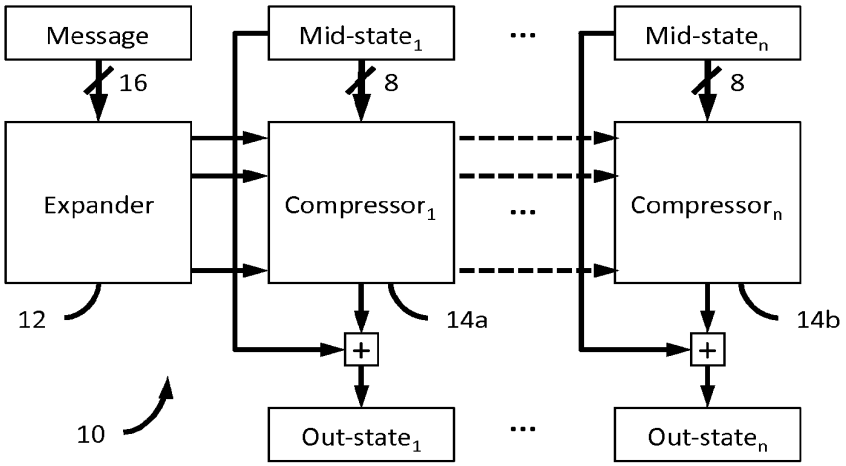

Message
Mid-state1
Mid-staten
16
8
8
Expander
Compressor1
Compressorn
12
14a
14b
10
Out-state1
Out-staten

Fig. 13

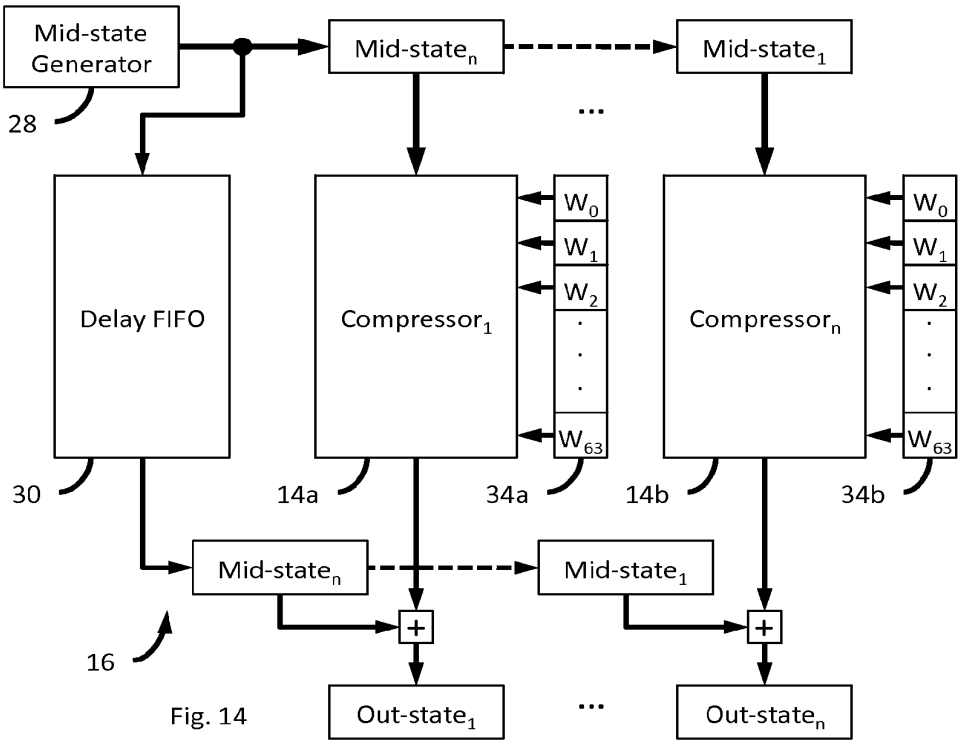


Fig. 14

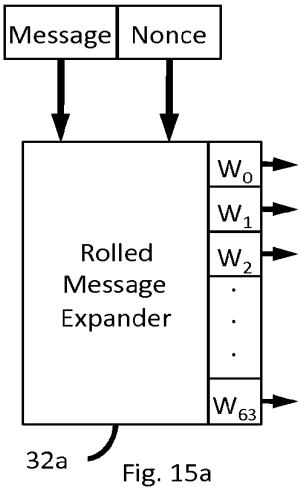


Fig. 15a

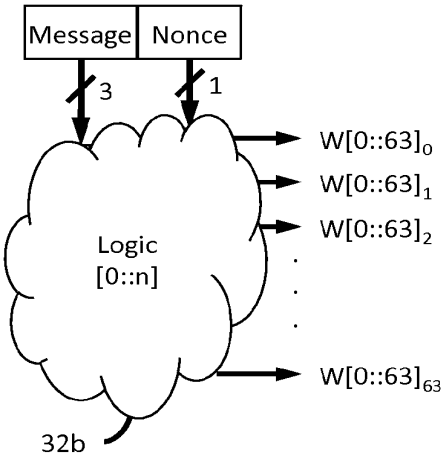


Fig. 15b

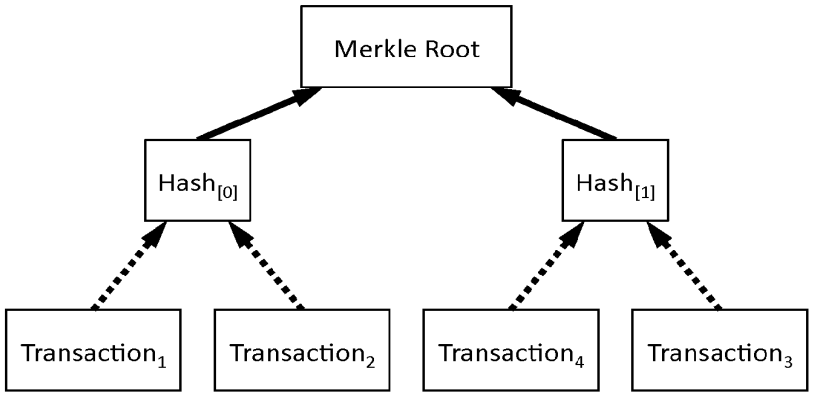
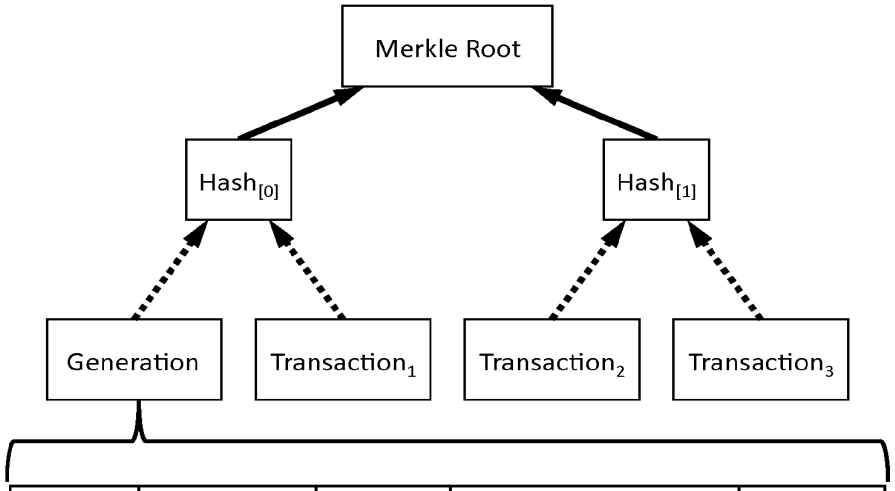


Fig. 16a



Hash	Index #	VI	Data	Seq #
32	4	1-9	Target::extraNonce	4

Fig. 16b

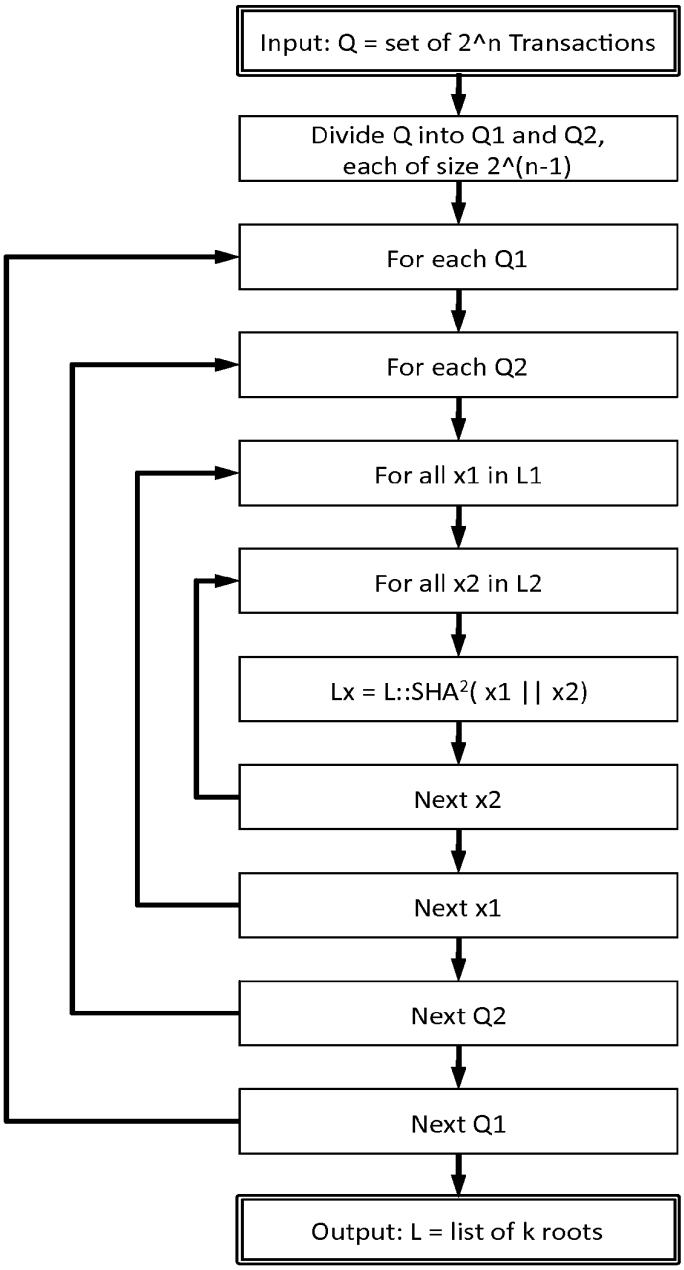

Input: Q = set of 2^n Transactions
Divide Q into Q1 and Q2, each of size 2^(n-1)
For each Q1
For each Q2
For all x1 in L1
For all x2 in L2
Lx = L::SHA2(x1 || x2)
Next x2
Next x1
Next Q2
Next Q1
Output: L = list of k roots

Fig. 17

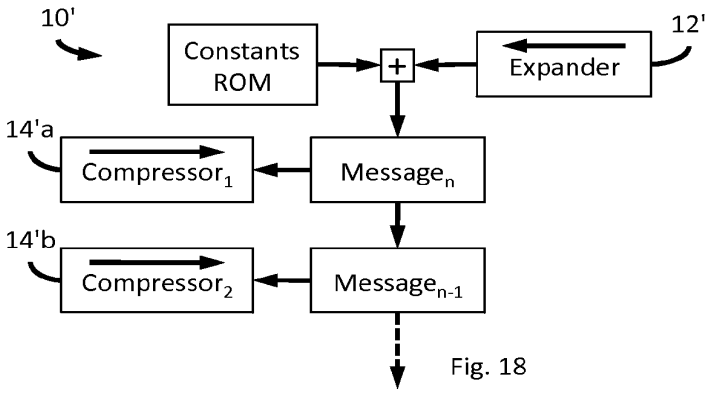

10'
Constants ROM
+
Expander
12'
14'a
Compressor1
Messagen
14'b
Compressor2
Messagen-1

Fig. 18

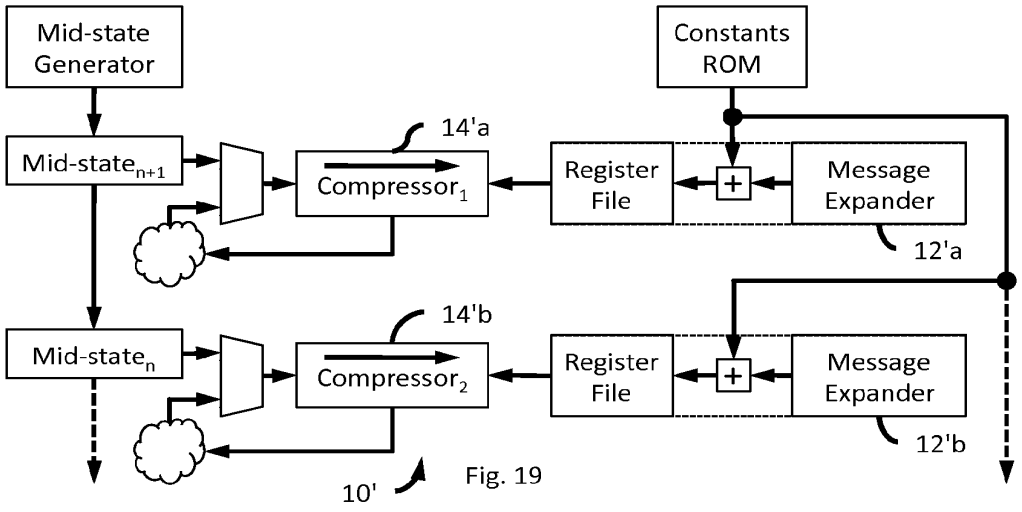

Mid-state Generator
Mid-staten+1
Compressor1
14'a
Constants ROM
Register File
+
Message Expander
12'a
Mid-staten
Compressor2
14'b
Register File
+
Message Expander
12'b
10'

Fig. 19

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 14/66470

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - G06F 17/30 (2015.01)
CPC - G06F 17/30539, G06F 2216/03, G06Q 10/10
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
CPC: G06F 17/30539, G06F 2216/03, G06Q 10/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
CPC: G06F 17/30489, G06F 17/30522; USPC: 707/776, 705/37, 713/181; IPC: G06F 17/30 (keyword limited - see search terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PatBase; Google; Google Scholar
Terms: cryptocurrency, cyber, crypto, virtual, currency, mining, hash, cryptography, encryption, transaction, expand, decompression, state, header, varying, seed, size, order, tree, root, merkle, leaf, node, block, chain.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2011/0246774 A1 (Phillips et al.) 06 October 2011 (06.10.2011), entire document, especially abstract, para [0014], [0029], [0036], [0069] [0074], [0075].	1-16
Y	US 2011/0307659 A1 (Hans et al.) 15 December 2011 (15.12.2011), entire document, especially abstract, para [0006], [0007], [0080], [0095], [0100], [0111], [0116], [0128], [0134], [0161], [0165], [0186], [0187], [0188].	1-13, 15/(1-13), 16/(1-13)
Y	US 6,097,811 A (Micali) 01 August 2000 (01.08.2000), entire document, especially abstract, col. 3, 12-29, col. 4, ln 4-20, col. 4, ln 66 to col. 5, ln 7, col. 6, ln 46-63.	7-9, 14, 15/(7-9, 14), 16/(7-9, 14)
A	US 2011/0145137 A1 (Driemeyer et al.) 16 June 2011 (16.06.2011), entire document.	1-16

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 January 2015 (28.01.2015)	23 FEB 2015
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

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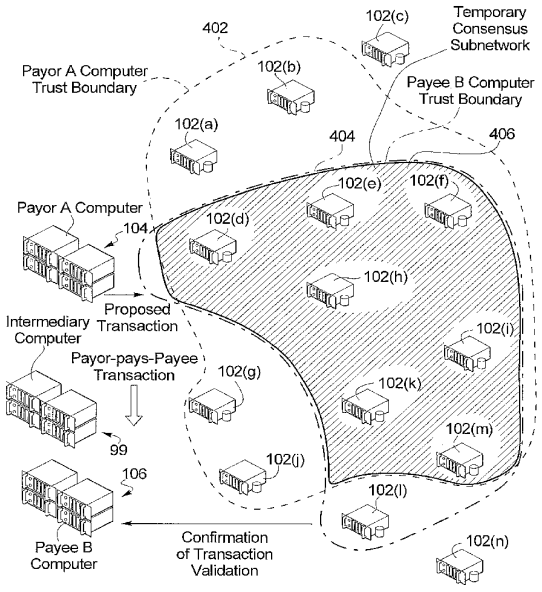
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(54) TEMPORARY CONSENSUS SUBNETWORK IN A DISTRIBUTED NETWORK FOR PAYMENT PROCESSING

(57) In a method, computer readable medium, or system for making a payment transaction between a payor having an associated payor computer with a ledger storage for the payor and a payee having an associated payee computer with a ledger storage for the payee in a consensus payment network having a plurality of nodes each comprising a respective computer with ledger storage and relying on consensus determinations, an initiator is provided for making the payment transaction between the payor and the payee, the initiator being either the payor, the payee, or an intermediary having an associated intermediary computer. The respective initiator computer creates a temporary payment transaction consensus subnetwork comprising a set of validation nodes acceptable to both the payor and the payee, the set of validation nodes comprising fewer than all of said plurality of nodes in the payment network. The initiator with the respective client computer processes the payment transaction via the consensus payment network from the payor to the payee based on a determination of consensus by the consensus network.

FIG. 5



EP 3 054 405 A1

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Description

RELATED APPLICATION

[0001] This application claims the benefit of provisional application 62/112,040, filed February 4, 2015 titled "AD HOC CONSENSUS SUBNETWORKS FOR PAYMENT PROCESSING", incorporated herein by reference.

BACKGROUND

[0002] The present disclosure relates generally to electronic payment systems and specifically to electronic payment systems that require an element of consensus among electronic payment system nodes for assigning validity to a transaction.

[0003] Electronic payment systems have largely supplanted other methods of payment for certain types of transactions. Some electronic payment systems rely on a central authority for validity of transactions, while others rely on consensus development. Validity can mean different things in different situations and the distinctions might not matter in all cases, but typically a transaction is deemed valid when it is proven to some level of certainty that the parties to the transaction agreed to be bound by terms of the transaction that bind them and that each of those parties is able to fulfill those terms. For example, the transaction "Alice pays Bob US$100" might be considered a valid transaction if it can be proven that Alice agreed to give up US$100 and that Alice has US$100 to give up. There might also be terms binding Bob such that the transaction validity depends on proving that Bob accepts the terms, to avoid situations where money, perhaps illegitimate money, is attempted to be transferred to a party not wanting to be involved in the transaction. One way to test if Alice agreed to it would be to check the validity of Alice's signature (written or digital) on a transaction record and one way to test if Alice has the US$100 to give up is to check that Alice's account somewhere trusted has at least that amount in it and those funds have not already been allocated to another.

[0004] An example of a central authority electronic payment system is a banking payment system. Assuming both Alice and Bob are customers of Bank C and have accounts with Bank C (and by extension, trust Bank C and Bank C's computer systems), Bank C would maintain an electronic ledger of prior transactions and/or current balances for each of its customers. Bank C uses Alice's entry of a password, PIN, passphrase, or other key supposedly only known to Alice prior to typing in details of a proposed transaction as presumptive proof that Alice agreed to give up the amount stated in the proposed transaction. Bank C uses Bank C's electronic ledger to determine whether Alice has those funds available. Verifying those aspects of the transaction, Bank C's computer systems can assume the validity of the transaction and update its electronic ledger accordingly, e.g., reducing Alice's account balance by US$100 and increasing Bob's account balance by US$100.

[0005] In the case where Alice and Bob do not both have accounts at any given bank, the central authority might be one level removed from the banks. For example, Alice might initiate an electronic transaction to transfer US$100 from her account at Bank D to Bob's account at Bank E via the Automated Clearing House ("ACH"), electronic check, PayPal exchanges, or other methods known to be usable. In the case of an ACH transfer, the ACH system trusts Bank D can meet the obligation to provide US$100 in settlement and Bank D, being trustworthy and wanting to continue to use the ACH system, will secure the funds from Alice's account at Bank D before obligating itself to the ACH system. Bank D can do this because it controls Alice's account balance - Bank D would know if Alice previously spent all the money in the account. In either case, the transaction is validated by a central authority that has the power to decide whether the transaction is valid. Most bank-based systems are of this form, wherein a bank decides (or more strictly speaking, a banking computer system or program decides) whether a given transaction is valid.

[0006] Some payment systems, such as the Bitcoin payment network, rely on consensus development for validity of transactions, as there is no central authority in the Bitcoin payment network. So, if Bob wanted to sell an object to Alice for a price of 1 bitcoin, Alice might pay Bob by generating a transaction using her Bitcoin wallet software with the transaction stating "Alice transfers 1 bitcoin to Bob" and Alice signs the transaction before announcing the transaction to any Bitcoin network nodes her Bitcoin wallet software has on its list of nodes. As the Bitcoin network nodes are programmed to accept such announcements and forward those announcements to the Bitcoin network nodes they in turn are aware of or are contacted by, eventually the proposed transaction will propagate to all, most or many of the active Bitcoin network nodes that happen to be operating at the time. Since there is no central authority controlling who can operate a Bitcoin network node, anyone can join as a node. However, having no relationship with Alice, the vast majority of those nodes would not blindly trust an announced transaction supposedly from Alice.

[0007] Some Bitcoin network nodes perform "Bitcoin mining" - a process that involves listening for transaction announcements, propagating those announcements, verifying the transactions, and adding those verified transactions onto a Bitcoin ledger that is added to by consensus. In particular, a Bitcoin miner computer system will check Alice's digital signature on the transaction (ignoring the transaction if the signature does not validate), check the Bitcoin ledger to ensure that Alice's Bitcoin wallet is the current possessor of the bitcoin (e.g., that the last validated transaction involving that bitcoin was a transaction that transferred it to Alice), bundle up a number of transactions into a block and publish that block as an addition to the Bitcoin ledger.

[0008] The Bitcoin system has features that make it

impractical for any minority of miner systems to just make up bogus transactions and add them to the Bitcoin ledger. One feature is that a difficult computational problem has to be solved (referred to as "proof-of-work") by the miner before its block publication would be accepted by other nodes. The solution to that difficult computational problem is a function of the transactions the miner included in the block, other contents of the block and prior blocks in the Bitcoin ledger, so if a solution is found, the miner is not able to modify the contents of the block prior to publication of the block without invalidating its own solution. Before accepting the published solution, other nodes would validate the transactions included in the block as well as verifying the publishing miner's solution. Nodes that validate the block add it to their copy of the Bitcoin ledger and since nodes propagate to other nodes these transactions and blocks, eventually the global state of the Bitcoin ledger is that all active nodes accept that the newly published block is valid and thus forms part of the shared Bitcoin ledger.

[0009] Bad actors cannot easily double-spend bitcoins, falsify transactions, or alter past transactions on the shared Bitcoin ledger because of the amount of work involved in finding these solutions to difficult computational problems and because there are so many other nodes that are each checking that the solution is valid for the block and that the transactions in the block are valid. Thus, spending the same bitcoins more than once, attempting to spend someone else's bitcoins without knowing their private key, altering older transactions, and the like would all invalidate the solution proposed by a bad actor, causing such actions to be ignored. In other words, a consensus builds that the bad actor's proposals should be ignored.

[0010] The downside is that it takes time for the difficult computational problems to be solved and for blocks to propagate and it takes considerable computing power to perform these actions throughout the Bitcoin network. This creates somewhat of a bottleneck. A new block is added to the shared Bitcoin ledger about every 10 minutes; the shared Bitcoin ledger is represented as a chain of blocks, each dependent on the prior blocks and containing one or more transactions. Until the transaction "Alice transfers the 1 bitcoin to Bob" is included into a block that is added to the shared Bitcoin ledger, Bob has little reason to assume that the transaction will go through. So, depending on the object Bob is selling, he might insist on Alice standing by for ten minutes or so before taking the object, in order to ensure that the transaction gets added to the shared Bitcoin ledger.

[0011] Another bottleneck is that blocks have a maximum size, and since only so many transactions can fit into a block, only so many transactions globally can be validated in a given time. Currently, those limits constrain a block to around 4000 transactions and with around one block being added around every ten minutes, the rate at which transactions can be processed globally is about seven transactions per second.

[0012] Yet another issue is that the proof-of-work for a block is being repeated by many, many nodes, only one of which will be compensated for the effort. Indeed, some commentators have noted that in some areas, it is possible that the cost of electricity needed to power the computation systems that perform this block mining can exceed the proceeds of the block mining.

[0013] A distributed payment consensus network has been developed and implemented as open source software and known as the Ripple® network operating according to the Ripple® protocol developed and implemented and commercially available from Ripple Labs Inc., 300 Montgomery St., Floor 12, San Francisco, California 94104, and incorporated herein by reference. An illustration of this network is shown in Prior Art FIG. 1, although as previously described other types of prior art consensus payment networks exist, such as Bitcoin. Ripple® is a registered trademark of Ripple Labs Inc. The Ripple® protocol is, at its core, a shared public database. The ledger is a distributed database - a perfect, shared record of accounts, balances, and transactions in the Ripple® protocol. It is continually and automatically updated by the Ripple® Transaction Protocol (RTXP) so that an identical ledger exists on thousands of servers around the world. At any time, anybody can review the ledger and see a record of all activity on the Ripple® protocol. When changes are made to the ledger, computers connected to the Ripple® protocol will mutually agree to the changes via a process called consensus. The Ripple® protocol reaches consensus globally within seconds of a change being made. The consensus finding process is the engineering breakthrough that allows for fast, secure, and decentralized transaction settlement on the Ripple® protocol.

[0014] The distributed payment consensus network implemented as the Ripple® network comprises a plurality of what are known as network nodes with each node comprising a node computer. When setting up the distributed payment consensus network where the nodes are provided by respective providers, each provider rates remaining providers within the consensus network being created based on subjective trust and creates a respective provider trust list for the respective node computer. In the prior art Ripple® network, this set up procedure determines network wide consensus rules that are applied to every transaction without regard for the stakeholders involved in any given payment transaction. The payor, payee, and any one or more intermediaries who institute the payment transaction are what are known as stakeholders in the payment transaction if they have a stake in the payment transaction.

[0015] A new currency was created for use in the Ripple® network called XRP or "ripples". However, the network will accept any other currency, including Bitcoins.

[0016] A Ripple® client is a computer which provides simple access to the Ripple® network. A gateway is a link between the Ripple® network and other payment networks. Gateways are needed for non XRP transactions.

SUMMARY

[0017] It is an object to provide more efficient methods of operating distributed ledgers and systems therefore.

[0018] In a method, computer readable medium, or system for making a payment transaction between a payor having an associated payor computer with a ledger storage for the payor and a payee having an associated payee computer with a ledger storage for the payee in a consensus payment network having a plurality of nodes each comprising a respective computer with ledger storage and relying on consensus determinations, an initiator is provided for making the payment transaction between the payor and the payee, the initiator being either the payor, the payee, or an intermediary having an associated intermediary computer. The respective initiator computer creates a temporary payment transaction consensus subnetwork comprising a set of validation nodes acceptable to both the payor and the payee, the set of validation nodes comprising fewer than all of said plurality of nodes in the payment network. The respective initiator computer processes the payment transaction via the consensus payment network from the payor to the payee based on a determination of consensus by the consensus network.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] Various exemplary embodiments in accordance with the present disclosure will be described with reference to the drawings.

FIG. 1 illustrates a prior art distributed payment consensus network for payment processing which is to be improved by use of a temporary consensus subnetwork as shown in FIG. 5;

FIG. 2 illustrates a prior art node of the distributed payment network of FIG. 1 in more detail;

FIG. 3 illustrates according to an exemplary embodiment of the invention a trusted nodes list for a payor A, a trusted nodes list for a payee B, and a trusted nodes list for an intermediary;

FIG. 4 illustrates according to an exemplary embodiment of the invention a consensus table illustrating mutual agreement by payor A and payee B for trusted nodes in the consensus network of FIG. 1;

FIG. 5 illustrates according to an exemplary embodiment of the invention a payor A computer trust boundary, a payee B computer trust boundary, and a temporary consensus subnetwork illustrating nodes where payor A and payee B have trusted node agreement;

FIG. 6 shows a prior art setup procedure for the prior art consensus network of FIG. 1; and

FIG. 7 shows a flow chart according to an exemplary embodiment of the invention indicating a transaction method according to at least one exemplary embodiment of a temporary consensus subnetwork in a distributed network for payment processing.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0020] For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the preferred exemplary embodiments/best mode illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the of the invention is thereby intended, and such alterations and further modifications in the illustrated embodiments and such further applications of the principles of the invention as illustrated as would normally occur to one skilled in the art to which the invention relates are included herein.

[0021] In a computer-implemented method for resolving transactions in a consensus payment network comprising a plurality of nodes and relying on consensus determinations, a payee and a payor are identified. A payor computer system having a ledger for the payor and a payee computer system having a ledger for the payee is provided. A temporary consensus subnetwork comprising a set of validation nodes is identified acceptable to the payor system and the payee system. A payment transfer (also referred to herein as a transaction) from the payor to the payee is processed based on a determination of consensus from the consensus subnetwork. As explained hereafter, one example of a consensus payment network to which the exemplary embodiment improvement may be applied is the aforementioned Ripple® network.

[0022] The logical temporary consensus subnetwork is preferably created for specific transactions and is then dissolved. Determinations of the logical consensus subnetwork can be propagated to other nodes in the payment network that are not part of the subnetwork after the transaction is complete for faster settling, while still providing network transparency.

[0023] In addition to the payor computer system and the payee computer system, one or more intermediary computer systems having ledgers may be interposed, such as when neither the payor and payee computer systems have ledgers for both the payor and the payee. In such cases, the logical consensus subnetwork may comprise a set of validation nodes that is also acceptable to the one or more intermediary computer systems.

[0024] In the exemplary embodiments described hereafter it is generally assumed that a transaction involves a payment from a payor to a payee such that an asset or obligation is transferred between the parties by balancing alterations in one or more electronic ledgers. A transaction can be as simple as one payor making a pay-

ment to one payee denominated in a currency that both the payor and the payee deal in and subject to a single jurisdiction. A transaction can be more complex and might involve multiple payors, multiple payees, an intermediary that converts currency and intermediaries that span jurisdictions. An intermediary that spans jurisdictions is useful where the payor is subject to one set of financial laws or rules and the payee is subject to a different set of financial laws or rules. By spanning jurisdictions, the intermediary will comply with both sets of laws or rules. The exemplary embodiments herein will be typically described with reference to the simple transaction but are not limited to the simple transaction. In some cases, the complex transaction can be split into multiple single hop transactions that have the added requirement that all of the multiple single hop transactions have to settle or none of them settle.

[0025] For example, suppose a U.S. bank account holder (say, a U.S. importing business) wants to make a payment to an EU bank account holder (say, a German exporting business). If the U.S. bank does not have an EU banking license, which is typical of most small and mid-sized banks, then the U.S. bank first transfers the funds to a large U.S. bank, its domestic correspondent bank. However, given that these banks operate different core account ledgers, they are unable to transact directly. Thus, the U.S. bank routes the funds through the Federal Reserve, which then relays the funds to the domestic correspondent bank. These funds are transferred via the ACH system. The correspondent bank maintains an account in the EU banking system, known as a nostro account, which is pre-funded with euros. After receiving USD funds via ACH, the domestic correspondent bank then initiates an offsetting EUR transfer from its nostro account to the beneficiary's bank in the EU banking system. Again, given that these EU banks also operate different account ledgers, the EU correspondent bank needs to route the funds via the European Central Bank, which acts as a clearing agent and finally relays the funds to the European bank where the German exporting business has an account.

[0026] International transactions typically need to go through a series of hops between domestic banks, central banks and correspondent banks. Each hop represents an additional layer of cost (usually a per transaction fee), risk (settlement and counterparty risk), and delay. Additionally, international transactions introduce FX conversion fees (for businesses/consumers) and currency reserve management costs (for banks). The path for transactions between two developing market regions can be even more complex and costly, and in some cases, non-existent.

[0027] As a way of avoiding these costs, some transactions are handled by a distributed ledger system. A distributed ledger system enables peer-to-peer transaction settlement and thus circumvents the complicated and costly correspondent banking framework, although banks and other financial institutions can still be part of a distributed ledger system. In a distributed ledger system, nodes of a network maintain a copy of the distributed ledger. Changes to the distributed ledger, representing transactions that apply to the ledger, are made once the network reaches a consensus that the transactions are complete.

[0028] With a distributed ledger system, each node may not need to be trusted by other nodes, as long as there is a mechanism to prevent nodes from easily making changes to the distributed ledger that are in fact not completed or completable transactions. For example, by having a rule that a considerable amount of computation is required (and proof of that work is required) before changes would be accepted as official changes to the distributed ledger, even untrustworthy nodes would not likely be employed to push out invalid transactions (such as ones not in fact authorized by the stated payor or not represented by assets actually controlled by the payor). One reason is that the untrustworthy node would perform all of the computation needed and its proposed change would just be ignored by other nodes and no consensus would build in order to add the proposed change to the distributed ledger. Since the operator of the node could expect no benefit from doing the work, it would not likely have the node do that work and even if it did, it would not matter to the rest of the network.

[0029] In some distributed ledger systems, there are nodes that perform work related to validating transactions that are not of interest to the operator of that node. This is the case with the Bitcoin network. An individual, a business, or an institution might be running a Bitcoin node, perhaps in the form of specialized hardware or a programmed general purpose computing system with network connectivity that sends and receives Bitcoin protocol messages. Some of those messages relate to proposed transactions and are propagated from node to node. Some of the nodes will "mine" transactions, i.e., collect pending transactions into a block and attempt to perform a complex computation task tied to the data of that block. One of the nodes will arrive at a solution to the complex computation task and propagate that to other nodes. Other nodes might also have been working on that complex computation task or a similar one, but since only one node can win, there is considerable computation going on that does not benefit the operator of the node performing that computation, nor is it of benefit to particular transaction parties or the network in general.

[0030] In part, this is by design in the Bitcoin network. If a transaction were not widely disseminated, it might only be seen by a few nodes that are configured to subvert the network. If adding a block to the distributed ledger was simple, then an untrustworthy node could flood the network with bogus transactions. Therefore, work and proof-of-work are needed there. In effect, many nodes participate in doing the distributed validation not because those nodes are involved in the underlying transactions, but to keep other nodes honest.

[0031] One downside of this approach is that double-

spending is not immediately caught, even though it might eventually be caught. For example, suppose Alice has an account balance of $US300, spends US$300 in a transaction sending those funds to Bob and then immediately spends US$300 in a transaction sending those funds to Charlie. In a Bitcoin network, it is possible to put forth both transactions. One way Alice could do that is to engineer the network so that the two signed transactions propagate over distinct paths and no nodes encounter both transactions. If Alice can maintain that state, each node that encounters one or the other of the transactions would consider them valid, since Alice signed them and there are funds to cover that one transaction. Fortunately, as the Bitcoin network operates by propagation and consensus, eventually some nodes will see both transactions, and then more nodes will see both transactions and the network would come to the consensus that both of the transactions are not valid. With the Bitcoin network, this clearing process takes around 8 to 12 minutes. While that is not necessarily a problem, it could be. If Alice's payment to Bob was payment on an invoice for goods sent, Bob is no worse off ten minutes after the transaction, as he can just decline to credit Alice's balance owing to Bob. However, if Charlie is a grocer and the transaction was for the payment of groceries provided to Alice, if the transaction is deemed invalid ten minutes after the purchase, Alice and the groceries are likely irretrievable. If a transaction is for online or in-app goods, such as the purchase of a special sword in a multi-player game, it may well be that Alice can purchase the sword and use it to great advantage over other players all while the purchase transaction is pending and before the consensus is reached that the transaction is not valid (or the transaction disappears for lack of validation).

[0032] To avoid such problems a temporary transaction specific validation consensus subnetwork is used in the present exemplary embodiments that uses less than all of the available nodes in the distributed payment network in building a consensus as to the validity of transactions.

[0033] An example of a distributed payment consensus network is the aforementioned Ripple® network.

[0034] FIG. 1 illustrates a prior art distributed payment consensus network 100 such as the previously described Ripple® network for payment processing. Of course as previously described other types of consensus payment networks are known, such as Bitcoin. Each node 102a-n of network 100 is a computer, computing system, or computing device, possibly virtualized, possibly implemented using specialized hardware, capable of sending messages to other nodes, receiving messages from other nodes, performing computations, and storing data. In FIG. 1 these computers are depicted as servers although they may not be. The exact details of the elements of nodes 102a-n need not be described, as conventional hardware or its equivalent can be used. In addition to nodes 102a-n it should be understood that other nodes not illustrated may also exist. The nodes not shown in FIG. 1 can be ignored.

[0035] Also shown in FIG. 1 are payor A computer 104 for payor A and payee B computer 106 for payee B. Those are intended to be general in this example. They have been illustrated to be a server, such as at a bank, which is connected to a client computer such as a desktop where the payor or payee may have interaction when making the payment or receiving the payment. The payor A or payee B computer may be any kind of computer, however. An initiator of a payment transaction between the payor A and the payee B may be either the payor A with payor computer 104, the payee B with payee computer 106, or an intermediary with an intermediary computer 99 (also shown as a server but can be any computer). One or more of the intermediary computers 99 may be provided. Intermediary computers may also be referred to as connectors. The intermediary may be an individual, a company, a credit card company, a clearing house, a market maker, an exchange, a foreign exchange, etc. The payor, payee, the one or more intermediaries, and one or more network nodes if they are also a payor, a payee or an intermediary are what are known as stakeholders in the payment transaction if they have a stake in the payment transaction. Each computer 104, 106, or 99 if applicable, can be implemented using a computer, computing system, or computing device, possibly virtualized, possibly implemented using specialized hardware, that is operated and controlled by an individual, a group, a business, an entity, etc. that is referred to herein generally as the "provider". Similarly, providers also supply and operate network nodes 102a-n with respective node computers. Some providers may operate more than one computer and/or more than one node. In some configurations, a stakeholder's computer might also be a node.

[0036] Although only one payor and one payee are shown, multiple payors and/or multiple payees may be provided. Thus a payment can be made from one payor to one payee, from one payor to one payee via one intermediary, from one payor to one payee via multiple intermediaries, and from multiple payors to multiple payees via multiple intermediaries.

[0037] It is assumed that each node is connected to a network in some way such that it can send and receive messages to and from other nodes. For clarity, the possible network connections between nodes are omitted in FIG. 1, but can be assumed.

[0038] FIG. 2 illustrates one prior art node in more detail. There, a node 202 is shown having a computing portion 204 with a network I/O interface 204A and a disk I/O interface 204B connected to a disc storage 206 with a stored distributed ledger for the respective node. Computing portion 204 may be software and/or a processor, memory, logic and other elements typically used for computing. In FIG. 1 the nodes have been shown as servers, but may be other types of computers. The network I/O interface allows computing portion 204 to send and receive messages over a network, such as messages to

and from other nodes. The disk I/O interface allows computing portion 204 to read and modify information such as a ledger in disc storage 206. Other memory and storage, not shown, may be employed.

[0039] The ledger can be in the form of a summary of past transactions, details of all past transactions, or some other data structure that would allow a node to determine a balance and/or account history as desired. Part of the computation that node 202 does is to receive changes to the ledger, decide whether to accept those changes, and send out its own changes.

[0040] A transaction may have an online part and an offline part, but that should not matter to how the online portion of the transaction occurs. An example would be a transaction of buying a car for an agreed amount of money, such as "Bob agrees to pay Charlie X units of currency C as consideration for Charlie agreeing to transfer title of an automobile to Bob". For the purposes of this example, assume that there is some mechanism that Bob uses on the side to ensure that Charlie gives the automobile to Bob. This can often involve the reputation of Charlie as a business person, but however it is accomplished, assume that the transaction that the payment network has to deal with is Bob paying Charlie X units of currency C. More specifically, the transaction would be a recordation of Bob transferring X units of currency C to Charlie with proof that Bob authorized the transfer and a mechanism to prevent Bob from failing to transfer (e.g., by spending those funds elsewhere or not having the funds) and to prevent Charlie from losing the benefit of the transfer.

[0041] In a centrally controlled payment system, those mechanisms involve balance checking, use of credit instruments, placing holds on accounts and the like. In a distributed ledger system, those mechanisms involve sufficient nodes reaching a consensus that Bob has the funds, the funds cannot be double-spent, that Bob agrees to the transaction, so that Charlie is able to be compensated for the transfer. "Sufficient" nodes may be the number of nodes needed to overpower any untrusted nodes working alone or together that would allow an invalid transaction to proceed. In the case of distributed payment network 100, referring back to FIG. 1, if all fourteen nodes 102(a)-102(n) agreed that Bob authorized the transaction and Bob is able to provide, and has provided, the assets to be transferred, the transaction could be considered valid.

[0042] If all fourteen nodes are operated by one entity and that entity is trusted, then payor A computer 104 and payee B computer 106 can trust that the transaction is valid, but then that is effectively a centrally controlled payment system distributed over hardware. Instead, consider the case where not all nodes 102 are trusted. Some nodes might be provided by unknown parties with unknown reputations. Other nodes might be provided by trusted parties, such as a central bank of a stable nation state, a banking institution with a reputation more valuable than any transactions it could possibly forge, or nodes trusted for other reasons.

[0043] Some nodes might be trusted by some nodes but untrusted by other nodes. For example, a U.S. company using the distributed payment network to make a salary payment to a programmer in Germany might trust nodes associated with payment processors operating in the U.S., but those nodes might not be trusted by the programmer in Germany (or the financial institutions actually performing the transactions for their customers).

[0044] One possible exemplary embodiment of the invention will now be described beginning with FIG. 3.

[0045] FIG. 3 provides an example of trust ratings in a trust list 210 for payor computer A and a trust list 211 for payee computer B to be used as an improvement in the prior art distributed payment network 100 of FIG. 1. As described hereafter in more detail these trust lists 210 and 211 for payor and payee are set up for each individual transaction and only a relatively smaller number of nodes of the consensus network need to participate in the individual transaction as described in greater detail hereafter. In this example, the trusted nodes for each payor and payee computer are shown. It should be understood that when a payor A makes a payment he uses a payor computer at his bank, for example, which determines the exemplary trust list on behalf of the payor. The same is true for the payee and the payee's bank computer which determines the trust list on behalf of the payee.

[0046] In the prior art Ripple® network, for the purposes of validating an individual transaction, stakeholder computers agree to only accept transactions that are validated at all fourteen nodes, but this is not necessary (and can be impractical with an actual number of nodes found in a distributed payment network). Instead, according to an exemplary embodiment of the invention, to allow for possibly near real-time clearing and more efficient processing, stakeholder computers agree to accept transactions that are validated using a temporary subnetwork as explained hereafter using less than all fourteen nodes.

[0047] If a stakeholder computer is one of the nodes of the consensus network shown in FIG. 1 then it already has its trust nodes list created as part of the setup described in FIG. 6 hereafter. However, if it is not one of the nodes of the consensus network 100, then, in addition to the trust node lists set up for the payor and payee, according to the exemplary embodiment of the invention a trust nodes list is also setup as shown at 213 in FIG. 3 for the intermediary computer.

[0048] As illustrated by the table 212 showing a trusted node agreement list in the "Mutual" column in FIG. 4, there is mutual agreement by payor computer A and payee computer B for nodes 102(d), 102(e), 102(f), 102(h), 102(i), 102(k), and 102(m). Intermediary computer 99 may also establish the mutual agreement. This mutual agreement for trusted nodes thus defines a temporary consensus subnetwork 406 which is illustrated in FIG. 5 by cross-hatching, and which represents an overlap between a payor A computer trust boundary 402 shown by

larger dashed lines and a payee B computer trust boundary 404 shown by smaller dashed lines. This subnetwork 406 is surrounded by a solid line. Computer A then sends proposed transaction information for the payment transaction to the temporary consensus subnetwork 406 and computer B as payee receives confirmation of transaction validation from the same temporary consensus subnetwork 406.

[0049] It may be that nodes are weighted by their computing power and different nodes might have different computing power, but for simplicity of explanation, assume each node has roughly the same power. Payor A computer 104 is willing to trust the subnetwork 406 because it trusts a supermajority of the nodes and payee B computer 106 is willing to trust the subnetwork because it also trusts a supermajority of the nodes, albeit a different supermajority.

[0050] In some instances, trust might be proxied by some protocol that prevents the breaking of trust, such as a requirement that nodes provide proof-of-work that precludes them from swamping the network with bogus transactions. For example, neither the payor or the payee computer trusts node 102(c) or node 102(m) but still can work with node 102(c) or 102(m) since that node is not powerful enough to flood the network with sufficient proof-of-work the generate consensus on a bogus transaction if the other nodes are disagreeing and also performing work.

[0051] Nodes not involved do not necessarily have to trust anything said by subnetwork 406, as it may be that the providers of those nodes do not care about transactions between payor A computer and payee B computer that do not involve those operators. Thus, they can accept the transactions at face value with no harm to those operators. There might be some harm if some subnetwork is spewing out transactions in an attempt to swamp the rest of the payment network, but that can be dealt with in other manners.

[0052] In some cases, for some transactions two computers may mutually agree to a single node that they both trust and that node would perform the validation of the transaction, so consensus building is not needed. This might occur where a trusted escrow company goes into business to provide transaction validation services. In that situation, nothing really needs to change relative to the larger subnetwork system, but the computers may reach agreement faster than if they have to negotiate to find an agreeable set of nodes.

[0053] One or more of the nodes might be market maker nodes, wherein the market maker serves as an intermediary to bridge portions of a transaction. For example, if the payor wanted to make a payment in currency C1 and the payee wanted to be paid in currency C2, the transaction might have two legs with an intermediary market maker node signaling that in exchange for receiving the payor's funds in currency C1 the intermediary market maker agrees to pay the payee in currency C2, with perhaps some market maker markup. Presumably the intermediary market maker has consensus itself to only enter into contracts it agrees to enter, so as long as a consensus is formed that the transaction is valid as to the payor, the payee and the market maker, the entire transaction can be considered validated.

[0054] Consider the case where, due to network propagation delays or the like, nodes do not all get notice of transactions that occur over the consensus subnetwork for some time. As an example, suppose that a non-participating node does not get notice of a transaction between one node and another node until 30 minutes after the transaction is initiated and at that time, the non-participating node performs calculations that determine that the payor's digital signature on the transaction was not actually the payor's digital signature. In order to cover such situations, the payment network might have a rule that no transaction is validated and final until all of the known nodes report a decision or at least 35 minutes pass. In many instances, such a time lag for clearing a transaction is unacceptable.

[0055] In the example described above, suppose that the consensus subnetwork came to a consensus that a transaction is valid in a few seconds or less and the parties to the transaction continued in their business assuming the transaction went forward and will not roll back. If later, non-participating node disagrees with the validity of the transaction 30 minutes after the transaction began and nearly 30 minutes since the consensus subnetwork came to a consensus, that disagreement can be ignored, since the parties involved agreed to a particular consensus subnetwork.

[0056] Depending on the transaction, an involved party might apply constraints on its agreement to a particular consensus subnetwork. For example, if a transaction is for the price of a candy bar, a merchant bank providing a payee B computer that accepts payments for a candy seller might have a rule that so long as three trusted nodes and in the consensus subnetwork and at least 20 apparently independent nodes are used, the merchant bank will agree to make the merchant whole if something later goes wrong. However, if a transaction is for a truckload of precious metals or a large number of shares of stock, a merchant bank operating a payee B computer that accepts payments for the seller of those assets might require a minimum of five trusted nodes known to be independent of each other and a minimum of 100 nodes, at least half of which are selected using a method not controlled or controllable by the payor or payor's computer. In some cases, the nodes used might be very interested in a particular transaction, such as where the nodes are operated by providers that provide offline guarantees of transactions.

[0057] As an example, the nodes with their node computers may be a consensus payment system network. Consensus may entail a supermajority of bridge network server computers mutually agreeing that a transaction within the network is valid, with the ledger being updated only when a given node determines that consensus has

been reached. Note that consensus need not be unanimous. Cryptography can be used to verify whether transactions are valid or not.

[0058] A temporary consensus subnetwork may exist for multiple transactions, for a set period of time, for a single transaction (transaction specific), or some other variant. For example, a temporary consensus subnetwork may be quickly formed for each transaction. Presumably, the temporary consensus subnetwork has the trust of the parties to the transaction as explained above.

[0059] Steps of the inventive temporary consensus subnetwork in a distributed network for a payment processing will now be described with respect to the flowcharts in shown in FIGS. 6 and 7.

[0060] FIG. 6 is prior art and illustrates for the Ripple® network generally at 500 a flowchart for a setup procedure. After start 501 providers of nodes for the prior art consensus network 100 shown in FIG. 1 construct or have already constructed a consensus distributed network for payment processing for payors and payees. Thus the providers contribute the nodes to create the prior art consensus network 100. Payor A computer 104, payee B computer 106, and/or intermediary computer 99 in FIG. 1 provide access to the consensus network 100 for the proposed payor-pays-payee transaction. Thereafter, in step 503 each provider rates remaining providers based on subjective trust and creates a respective provider trust list for the respective node computer. This setup procedure then concludes as shown at end step 504.

[0061] If the intermediary computer 99 is one of the nodes of the consensus network 100 shown in FIG. 1, then the trust list for that intermediary computer is created in the setup procedure as just described above. However, if the intermediary computer is not one of the nodes of the consensus network then its trust nodes list is created as previously described and referenced as the intermediary computer trust nodes list 213 shown in FIG. 3.

[0062] Referring now to FIG. 7, the transaction method for an individual transaction according to one exemplary embodiment of the invention after the setup previously described in FIG. 6 is illustrated generally at 600.

[0063] After start 601, at 602 for an individual payment transaction initiated by an initiator, the initiator computer collects trust lists from the payor computer, the payee computer, and any other intermediary computers and network node computers if they are also a payor, a payee, or an intermediary computer which hold a stake in the individual payment transaction (the "stakeholder" computers). These should be the trust lists for payor and payee computers shown in FIG. 3, for example, and similarly created trust lists for the other stakeholder computers.

[0064] At step 603 the initiator then calculates the intersection of the collected trust lists as previously described in relation to FIG. 4. The intersecting nodes become consensus subnetwork members.

[0065] In step 604, where n is the number of member nodes in the consensus subnetwork, the initiator calculates the necessary decision quorum as $q = 2n/3$ -that is the number of nodes necessary to reach agreement.

[0066] At step 605, the initiator submits the proposed payment transaction for validation to each member node computer of the consensus subnetwork. As part of this process, the initiator also submits a messaging timeout, a list of the other subnetwork members, and the quorum as computed in steps 603 and 604.

[0067] At step 606, upon receiving the proposed transaction from the initiator computer, each member node computer checks that the transaction meets the validating rules of the ledger they operate. This may include checking to make sure the payor has sufficient funds to make the transaction. It also may include checking each intermediary step in the transaction. If the transaction appears valid, it is conditionally applied to the local ledger. This conditional application assures that the validation conditions cannot change prior to reaching a final validation consensus.

[0068] At step 607, each validating member computer broadcasts a verifiable copy of its decision to every other member of the consensus subnetwork. Decision messages should be verifiable in order to prevent forged broadcasts. Verification is through public key cryptography or HMAC or other mechanism cryptographic.

[0069] At step 608, each member listens for validation decisions from the other member computers of the consensus subnetwork. Member computers continue waiting until either it has received a quorum of verified decisions or the timeout (supplied at step 605) expires.

[0070] At step 609, if a quorum of member computers decide to validate the transaction, then all member computers permanently commit the transaction to their local ledger.

[0071] At step 610, if a quorum of member computers decide a transaction is invalid or a decision quorum is not achieved within the specified time period, all member computers rollback the conditionally applied changes, thus restoring pre-transaction balances.

[0072] Optionally, depending on the payment network implemented, at step 611 validating nodes may broadcast transactions and validation decisions to other node computers in the payment network so their local ledgers can be updated. This may include propagating only validated transactions or propagating all decisions, thus enabling a common record.

[0073] The method is then ended at step 612.

[0074] Operations of processes described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. Processes described herein (or variations and/or combinations thereof) may be performed under the control of one or more computer systems configured with executable instructions and may be implemented as code (e.g., executable instructions, one or more computer programs or one or more applications) executing collectively on one or more processors, by hardware or combinations thereof. The code may be stored on a computer-readable storage medium, for example, in the form

of a computer program comprising a plurality of instructions executable by one or more processors. The computer-readable storage medium may be non-transitory.

[0075] The use of any and all examples, or exemplary language (e.g., "such as") provided herein, is intended merely to better illuminate embodiments of the invention and does not pose a limitation on the scope of the invention unless otherwise claimed. No language in the specification should be construed as indicating any non-claimed element as essential to the practice of the invention.

[0076] Further embodiments can be envisioned to one of ordinary skill in the art after reading this disclosure. In other embodiments, combinations or sub-combinations of the above-disclosed invention can be advantageously made. The example arrangements of components are shown for purposes of illustration and it should be understood that combinations, additions, re-arrangements, and the like are contemplated in alternative embodiments of the present invention. Thus, while the invention has been described with respect to exemplary embodiments, one skilled in the art will recognize that numerous modifications are possible.

[0077] For example, the processes described herein may be implemented using hardware components, software components, and/or any combination thereof. The specification and drawings are, accordingly, to be regarded in an illustrative rather than a restrictive sense. It will, however, be evident that various modifications and changes may be made thereunto without departing from the broader spirit and scope of the invention as set forth in the claims and that the invention is intended to cover all modifications and equivalents within the scope of the following claims.

[0078] All references, including publications, patent applications, and patents, cited herein are hereby incorporated by reference to the same extent as if each reference were individually and specifically indicated to be incorporated by reference and were set forth in its entirety herein.

[0079] Although preferred exemplary embodiments are shown and described in detail in the drawings and in the preceding specification, they should be viewed as purely exemplary and not as limiting the invention. It is noted that only preferred exemplary embodiments are shown and described, and all variations and modifications that presently or in the future lie within the protective scope of the invention should be protected.

Claims

1. A method for making a payment transaction between a payor having an associated payor computer with a ledger storage for the payor and a payee having an associated payee computer with a ledger storage for the payee in a consensus payment network having a plurality of nodes each comprising a respective computer with ledger storage and relying on consensus determinations, comprising the steps of:

   providing an initiator for making the payment transaction between the payor and the payee, the initiator being either the payor, the payee, or an intermediary having an associated intermediary computer;
   the respective initiator computer creating a temporary payment transaction consensus subnetwork comprising a set of validation nodes acceptable to both the payor and the payee, the set of validation nodes comprising fewer than all of said plurality of nodes in the payment network; and
   the respective initiator computer processing the payment transaction via the consensus payment network from the payor to the payee based on a determination of consensus by the consensus subnetwork.

2. The method of claim 1 wherein the intermediary comprises at least one of an individual, a company, a credit card company, a clearing house, a market maker, an exchange, and a foreign exchange.

3. The method of claim 1 or 2,
   wherein the intermediary computer further comprises one of the node computers of said payment network, and wherein the intermediary is acceptable to both the payor and the payee.

4. The method of claim 1, 2 or 3, wherein only one payor and only one payee are provided but a plurality of intermediaries are provided for making the payment transaction between the payor and the payee.

5. The method of one of the preceding claims,
   wherein a plurality of payors are provided; and / or
   wherein a plurality of payees are provided.

6. The method of one of the preceding claims, wherein providers contribute said nodes to create said consensus network, and each provider rates remaining providers based on subjective trust and creates a respective provider trust list for the respective node computer.

7. The method of one of the preceding claims,
   wherein stakeholder computers are all computers having a stake in the payment transaction, and the initiator computer determines the consensus subnetwork by collecting trust lists from each stakeholder computer, intersecting the trust lists, and a quorum for the subnetwork as the number of nodes necessary for the subnetwork to reach agreement;

8. The method of claim 7,

wherein the initiator computer submits the proposed transaction for validation to each member node computer of the consensus subnetwork;
wherein optionally each member node computer of the consensus subnetwork validates the proposed transaction and conditionally applies it to the respective ledger of the member node computer;
wherein optionally each member node computer broadcasts its validation decision to the consensus subnetwork.

9. The method of claim 8,
wherein each member node computer waits for the quorum from the consensus subnetwork and if the quorum votes to validate the transaction, each member node computer permanently commits the conditionally applied transaction, or if the quorum does not vote to validate the transaction the member node computers of the subnetwork roll back the proposed transaction; and
wherein optionally member node computers broadcast decisions to remaining node computers in the payment network.

10. The method of one of the preceding claims, wherein the creating of the temporary payment transaction consensus subnetwork comprises:

the initiator computer receiving a payor node list of nodes acceptable to the payor, receiving a payee node list of nodes acceptable to the payee, and determining a consensus node list, said consensus node list identifying nodes in said consensus subnetwork which comprise said set of validation nodes acceptable to both the payor and the payee.

11. The method of one of the preceding claims, further comprising:

upon processing the transaction, member node computers of the temporary payment transaction consensus subnetwork broadcast all ledger changes to remaining node computers in the payment network;
wherein optionally the consensus node list is deleted once one or more of the payment transactions is complete.

12. The method of one of the preceding claims, wherein the created temporary payment consensus subnetwork is transaction specific and is no longer used after said payment transaction.

13. A non-transitory tangible computer readable medium having a program thereon for making a payment transaction between a payor having an associated payor computer and a payee having an associated payee computer in a consensus payment network having a plurality of nodes each comprising a respective computer with ledger storage and relying on consensus determinations, and wherein an initiator is provided who is either the payor, the payee, or an intermediary having an associated intermediary computer for making the payment transaction between the payor computer and the payee computer, said program performing the steps of:

causing the respective initiator computer to create a temporary payment transaction consensus subnetwork comprising a set of validation nodes acceptable to both the payor and the payee, the set of validation nodes comprising fewer than all of said plurality of nodes in the payment network; and
causing the respective initiator computer to process the payment transaction via the consensus payment network from the payor to the payee based on a determination of consensus by the consensus subnetwork.

14. The non-transitory tangible computer readable medium of claim 13, wherein the program is capable to execute the method of one of claims 1 to 12.

15. A system for making a payment transaction between a payor and a payee, comprising:

the payor having an associated payor computer with a ledger storage for the payor;
the payee having an associated payee computer with a ledger storage for the payee;
a consensus payment network having a plurality of nodes each comprising a respective computer with ledger storage and relying on consensus determinations;
an initiator for making the payment transaction between the payor and the payee, the initiator being either the payor, the payee, or an intermediary having an associated intermediary computer;
the respective initiator computer creating a temporary payment transaction consensus subnetwork comprising a set of validation nodes acceptable to both the payor and the payee, the set of validation nodes comprising fewer than all of said plurality of nodes in the payment network; and
the respective initiator computer processing the payment transaction via the consensus payment network from the payor to the payee based on a determination of consensus by the consensus subnetwork.

16. The system of claim 15, wherein the system is configured to execute the method of one of claims 1 to 12.

FIG. 1

(PRIOR ART)

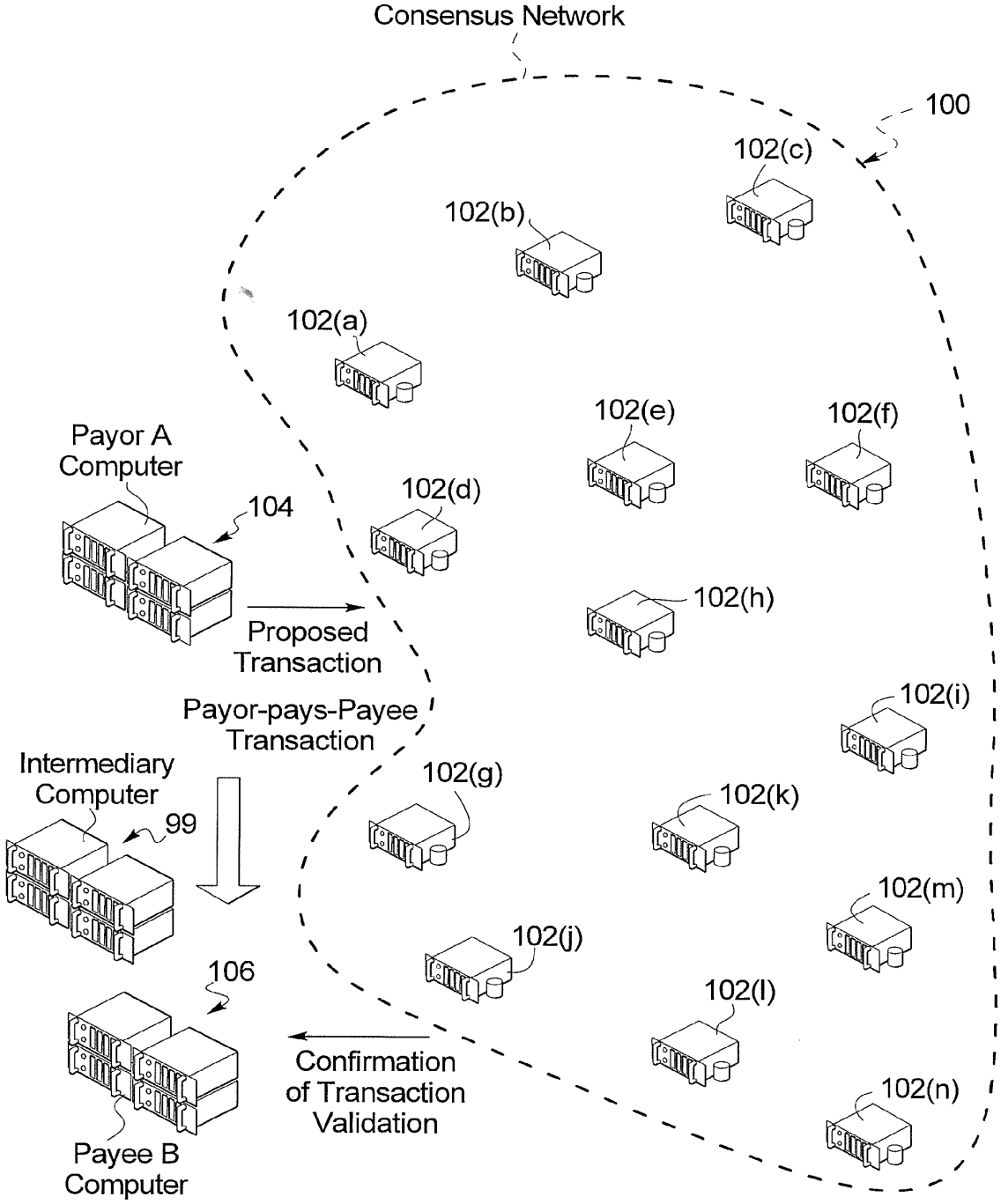


FIG. 2
(PRIOR ART)

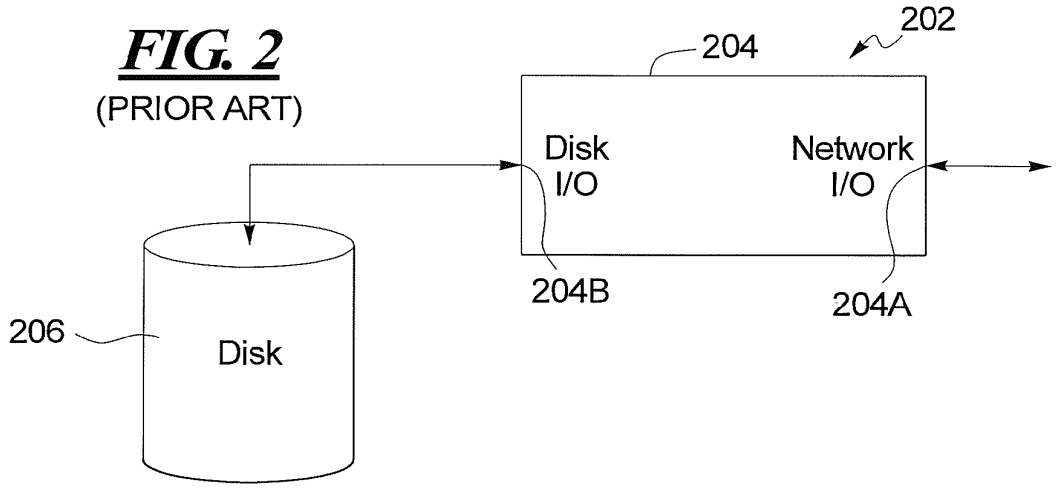


FIG. 3

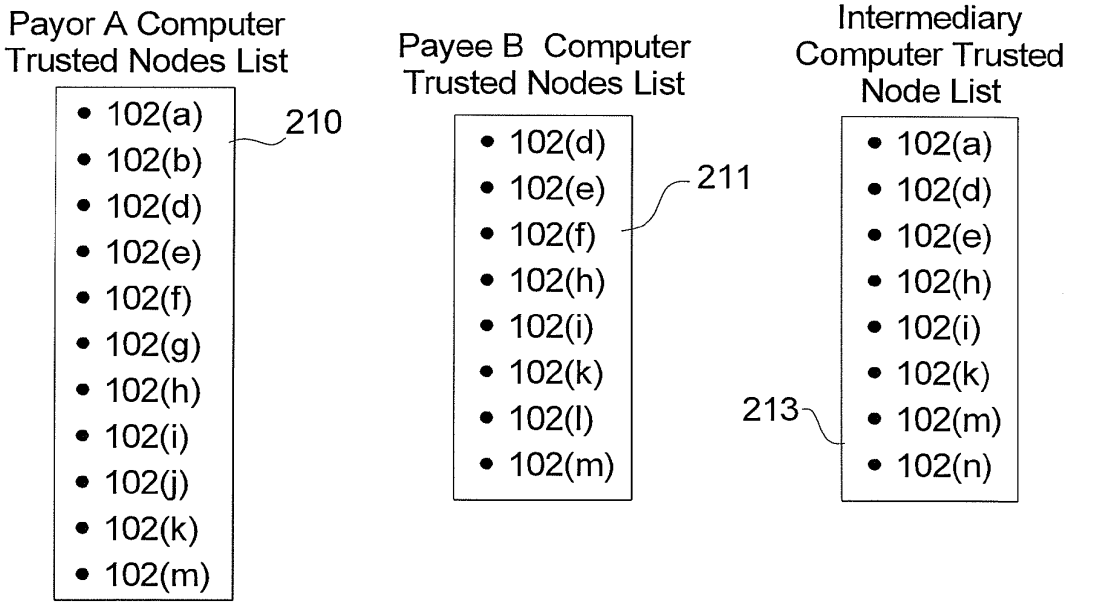


FIG. 4

Table Showing Trusted Node Agreement List 212

Node ID	Trust A	Trust B	Mutual
102(a)	Yes	No	No
102(b)	Yes	No	No
102(c)	No	No	No
102(d)	Yes	Yes	Yes
102(e)	Yes	Yes	Yes
102(f)	Yes	Yes	Yes
102(g)	Yes	No	No
102(h)	Yes	Yes	Yes
102(i)	Yes	Yes	Yes
102(j)	Yes	No	No
102(k)	Yes	Yes	Yes
102(l)	No	Yes	No
102(m)	Yes	Yes	Yes
102(n)	No	No	No

FIG. 6

(PRIOR ART)

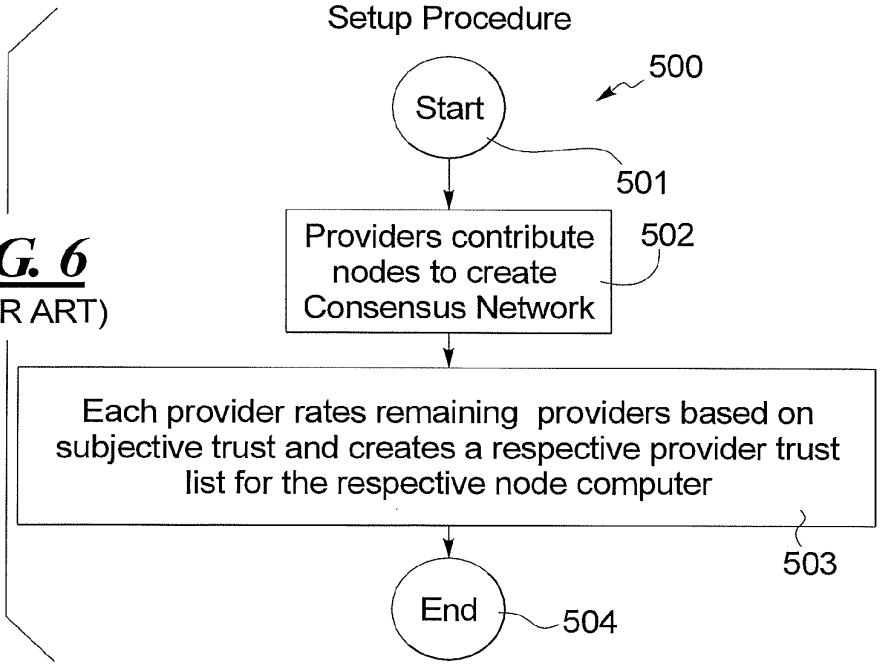


FIG. 5

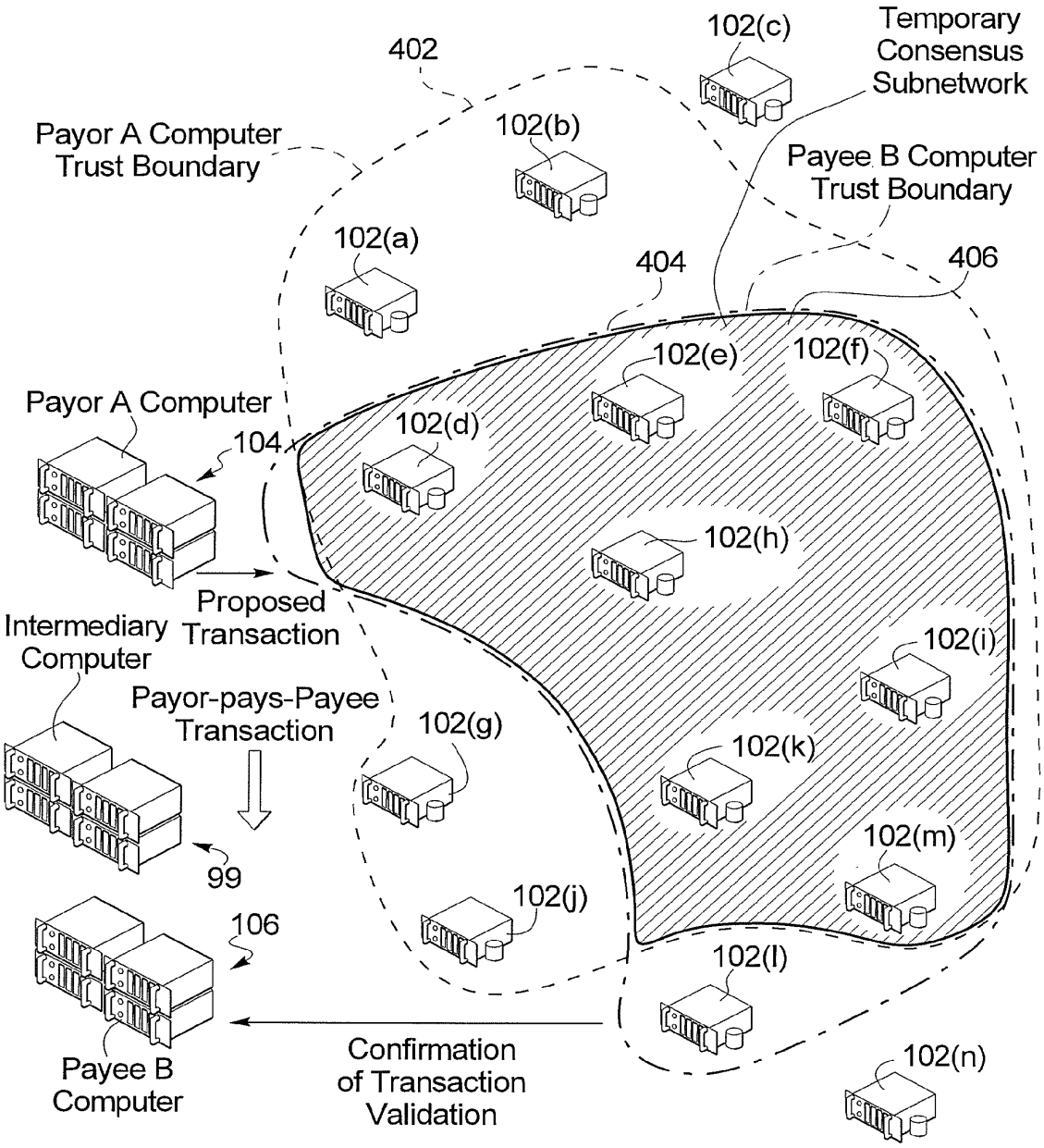
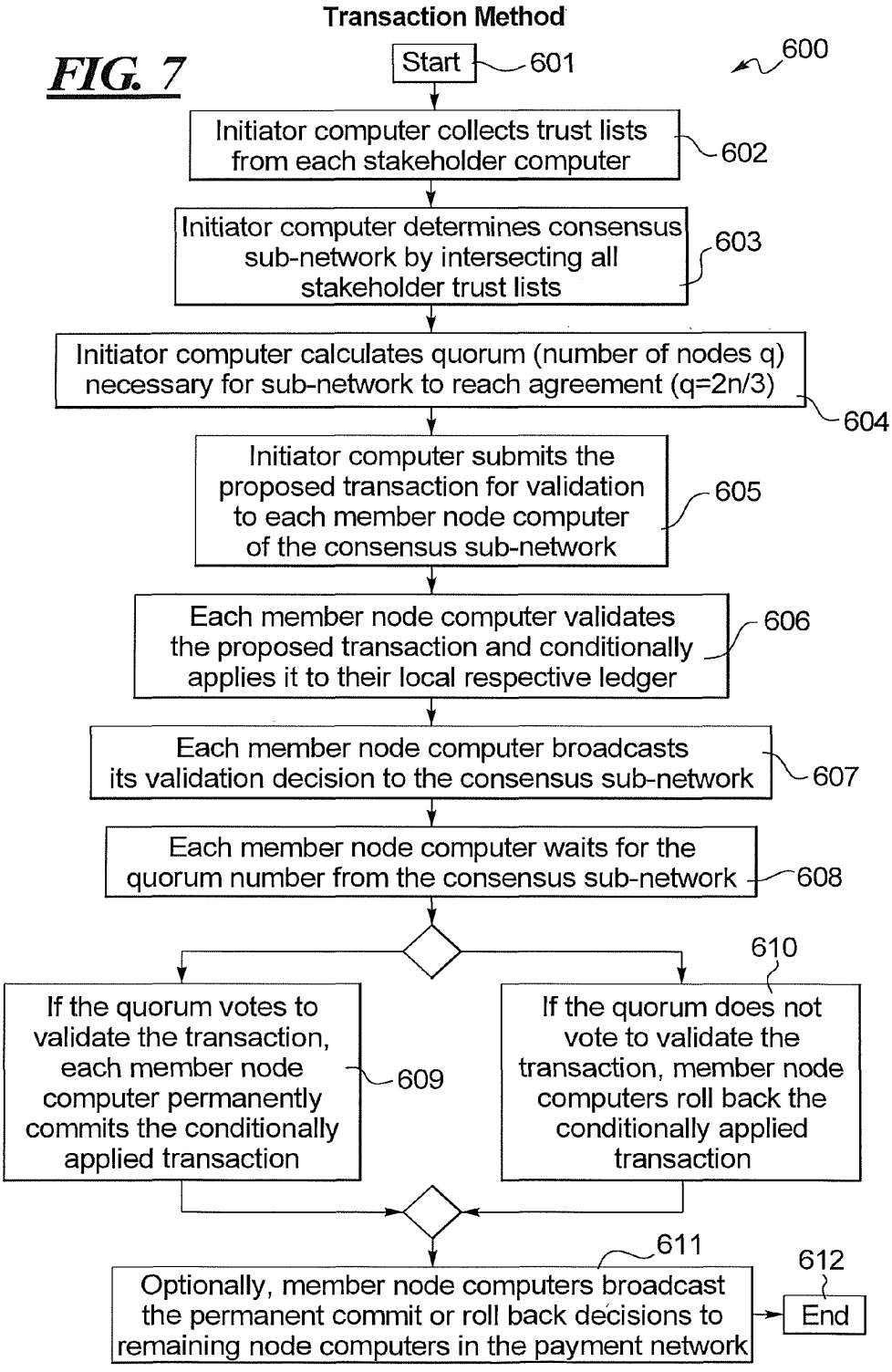

402
102(c)
Temporary Consensus Subnetwork
Payor A Computer Trust Boundary
102(b)
Payee B Computer Trust Boundary
102(a)
404
406
102(e)
102(f)
Payor A Computer
104
102(d)
102(h)
Proposed Transaction
Intermediary Computer
Payor-pays-Payee Transaction
102(i)
102(g)
102(k)
99
102(m)
102(j)
106
102(l)
Payee B Computer
Confirmation of Transaction Validation
102(n)

FIG. 7


Transaction Method
600
Start
601
Initiator computer collects trust lists from each stakeholder computer
602
Initiator computer determines consensus sub-network by intersecting all stakeholder trust lists
603
Initiator computer calculates quorum (number of nodes q) necessary for sub-network to reach agreement (q=2n/3)
604
Initiator computer submits the proposed transaction for validation to each member node computer of the consensus sub-network
605
Each member node computer validates the proposed transaction and conditionally applies it to their local respective ledger
606
Each member node computer broadcasts its validation decision to the consensus sub-network
607
Each member node computer waits for the quorum number from the consensus sub-network
608
610
If the quorum votes to validate the transaction, each member node computer permanently commits the conditionally applied transaction
609
If the quorum does not vote to validate the transaction, member node computers roll back the conditionally applied transaction
611
Optionally, member node computers broadcast the permanent commit or roll back decisions to remaining node computers in the payment network
612
End

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 16 15 3967

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	Andrew S. Tanenbaum ET AL: "Distributed Systems: Principles and Paradigms (2nd Edition)", 12 October 2006 (2006-10-12), Prentice Hall, XP055263689, ISBN: 978-0-13-239227-3 pages ToC,Ch01-02,Ch07-Ch09,Ch11,Ch14,Ind, * pages 24,29 - pages 30, 277 * * page 1 - page 16 *	1-16	INV. G06Q20/02
X	George Coulouris ET AL: "Distributed Systems: Concepts and Design (5th Edition)", 7 May 2011 (2011-05-07), Addison-Wesley, US, XP055263685, ISBN: 978-0-13-214301-1 pages ToC, Pre, Ch01-Ch04, Ch12, Ch14-Ch15, Ch18, Ind, * page 8 - page 16 * * page 37 - page 48 *	1-16	
X	Pedro Franco: "Understanding Bitcoin: Cryptography, Engineering and Economics", 24 November 2014 (2014-11-24), Wiley, XP055263697, ISBN: 978-1-119-01916-9 pages 203-207, * page 203 - page 206 *	1-16	TECHNICAL FIELDS SEARCHED (IPC) G06Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 April 2016	Krafft, Gerald

CATEGORY OF CITED DOCUMENTS

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

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

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 62112040 A **[0001]**

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 91-3PCT	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/CA2018/050135	International filing date *(day/month/year)* 06 February 2018 (06.02.2018)	Priority date *(day/month/year)* 08 February 2017 (08.02.2017)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant UPSTREAM DATA INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 13 August 2019 (13.08.2019)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Athina Nickitas-Etienne e-mail: pct.team4@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
NISSEN, ROBERT A.
c/o Nissen Patent Law
200 - 10328 81 Avenue
EDMONTON, Alberta
Canada, T6E 1X2

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	11 June 2018 (11-06-2018)
Applicant's or agent's file reference 91-3PCT	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/CA2018/050135	06 February 2018 (06-02-2018)	08 February 2017 (08-02-2017)

International Patent Classification (IPC) or both national classification and IPC
IPC: ***E21B 41/00*** (2006.01) , ***G06F 19/00*** (2018.01) , ***G06Q 20/08*** (2012.01) , *G06F 17/30* (2006.01)

Applicant
UPSTREAM DATA INC.

1. This opinion contains indications relating to the following items:

- ☑ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☑ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☑ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/CA	Date of completion of this opinion	Authorized officer
Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	25 May 2018 (25-05-2018)	Alison Canteenwalla (819) 639-4802

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No
PCT/CA2018/050135

Box No I **Basis of this opinion**

1. With regard to the **language**, this opinion has been established on the basis of:

☑ the international application in the language in which it was filed.

☐ a translation of the international application into which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

a. ☐ forming part of the international application as filed:

☐ in the form of an Annex C/ST.25 text file.

☐ on paper or in the form of an image file.

b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-41	YES
	Claims	none	NO
Inventive step (IS)	Claims	none	YES
	Claims	1-41	NO
Industrial applicability (IA)	Claims	1-41	YES
	Claims	none	NO

2. Citations and explanations:

Documents cited:
D1: US20080135238 A1 (Cugnet et al.) 12 June 2008 (12-06-2008)
D2: US20160261685 A1 (Chen et al.) 8 September 2016 (08-09-2016)

Novelty (N):

Claims 1-41 are novel and therefore comply with PCT Article 33(2). Document D1 is considered to represent the closest prior art. Document D1 discloses a system comprising a source or combustible gas produced from an oil production and a generator connected to the source. However, none of the cited documents discloses a blockchain mining device connected to the generator. Claims 1-41 are therefore novel.

Inventive step (IS):

Claims 1-41 do not involve an inventive step and therefore do not comply with PCT Article 33(3).

Document D1 discloses in figure 3 a system comprising a source of combustible gas produced from an oil production (paragraph [0009]) and a generator (40) connected to the source of combustible gas.

Document D2 discloses a blockchain network powered by a source of power (paragraphs [0032]-[0039]).

Therefore it would not be considered inventive to use the system of document D1 to power the blockchain network of document D2. It would have been obvious to a person skilled in the art to arrive at the matter defined in claims 1-41 by combining the teachings of documents D1 and D2.

With respect to the dependent claims 2-8, 14, 15, 25-33, 37 document D1 discloses the oil production comprising a remote oil well (paragraph [0003]) and the well is connected to produce a flow of combustible gas to power an engine (30) and the generator (paragraph [0009]). The source of gas can be an oil storage (115) (paragraph [0046]) and there are two engines (30A, 30B) (paragraph [0048]). The system further includes a controller (120) for modulating the power load level in response to variations in a production rate of combustible gas (paragraph [0046]).

The additions of claims 9 and 20-23 would be considered design features that are well-known in the art and are not considered inventive.

See continuation in Supplemental Box No. V

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claims 3 and 14 do not comply with PCT Article 6. These claims are not concise, because they are identical or are so close in content that they address the same subject matter.

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**

Continuation of: Box No. V

Inventive step (IS) continued:

The features of dependent claims 10-13, 19, 34-36 are disclosed by document D2.
Document D2 discloses a blockchain mining device having a network interface and a mining processor. The network in a peer to peer network and the blockchain database is a distributed database stored on plural nodes for storing transactional information for a digital currency (paragraphs [0032]-[0039]). Document D2 further discloses that the amount of mining that can be done is limited by the amount of power available from the power source and that the temperature of the device has to be controlled (paragraph [0104]).

Claims 16-18 and 38-40 further define modulating the power load of the blockchain mining device based on an excess or lack of power from the production rate of the well. These modifications are considered design options that would be obvious to a person skilled in the art.

Industrial applicability (IA)

The subject matter of claims 1-41 is considered to be industrially applicable and thus complies with the requirements of PCT Article 33(4).

PTO/AIA/80 (07-17)
Approved for use through 01/31/2018. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no person is required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

[X] Practitioners associated with Customer Number: 130443

OR

[ ] Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

[X] The address associated with Customer Number: 130443

OR

[ ]

Firm or individual name		
Address		
City	State	Zip
Country		
Telephone	Email	

Assignee name and address: UPSTREAM DATA INC.
3210 - 65th Avenue, Lloydminster, Alberta T9V 3G9, Canada

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature SEB	Date August 7, 2019
Name Stephen Barbour	Telephone
Title President	

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 update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 18 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.

Privacy Act Statement

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

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

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

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
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 displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Stephen Barbour

Application No./Patent No.: 16484728 Filed/Issue Date: 08/08/2019

Titled: BLOCKCHAIN MINE AT OIL OR GAS FACILITY

UPSTREAM DATA INC., 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: _____ To: _____

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

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

2. 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.

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.**

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

PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

3. 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.

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.

/RobertNissen#64256/	January 6, 2020
Signature	Date
Robert A Nissen	64256
Printed or Typed Name	Title or Registration Number

[Page 2 of 2]

Privacy Act Statement

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

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

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

ASSIGNMENT

In consideration of good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, each Assignor named below hereby assigns and confirms that the Assignor has assigned to the Assignee named below, whose address is as shown below, all of the Assignor's interest for Canada, the United States and the entire world in the following listed patent applications and/or patents, the inventions described therein, any patent granted from the patent applications, and any patent or patent application claiming domestic or foreign priority from any one or more of the patent applications, including the right to claim priority from the patent applications under any national law or international convention [, and any corresponding industrial design application or registered design or design patent]:

Title: BLOCKCHAIN MINE AT OIL OR GAS FACILITY	
US Patent application No. 16484728 Filing Date: August 8, 2019	Canadian Patent application No Filing Date:
PCT patent application no. PCT/CA2018/050135 Filing Date: February 6, 2018	

[Nissen Patent Law has authority to insert the serial number and filing date]

Assignor will, without further consideration, but at the expense of Assignee, do all such things and execute all such documents as may be necessary or desirable to obtain and maintain patents for the inventions and for additions and modifications thereto in any country.

Assignor enters into this assignment freely, and consents to disclosure of all personal information contained herein to the extent required to prosecute, maintain and enforce the rights assigned.

This assignment is governed by the laws of Alberta, Canada, and is effective February 8, 2017.

ASSIGNORS

Assignor name: Stephen Barbour
Signature of assignor: SE Barbour Date of signing: August 7, 2019
Witness name (print): Morgan Blakely
Witness signature: Morgan Blakely

ASSIGNEES

Assignee: UPSTREAM DATA INC.
Address of assignee: 3210 65 Avenue, Lloydminster, AB, T9V 3G9
Signature of assignee: SE Barbour Date of signing: August 7, 2019
Name and title of representative if Assignee is a corporation: Stephen Barbour, president
Witness name (print): Morgan Blakely
Witness signature: Morgan Blakely

Electronic Patent Application Fee Transmittal

Application Number:	16484728
Filing Date:	08-Aug-2019
Title of Invention:	BLOCKCHAIN MINE AT OIL OR GAS FACILITY
First Named Inventor/Applicant Name:	Stephen Barbour
Filer:	Robert Anton Nissen
Attorney Docket Number:	91A-3US

Filed as Small Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
BASIC NATIONAL STAGE FEE	2631	1	150	150
NATL STAGE SEARCH FEE - ALL OTHER CASES	2632	1	330	330
NATL STAGE EXAM FEE - ALL OTHER CASES	2633	1	380	380
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	2615	21	50	1050
Miscellaneous-Filing:				
OATH/DECL > 30 MOS FROM 371 COMMENCEMENT	2617	1	70	70

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1980**

Electronic Acknowledgement Receipt	
EFS ID:	38209172
Application Number:	16484728
International Application Number:	
Confirmation Number:	1944
Title of Invention:	BLOCKCHAIN MINE AT OIL OR GAS FACILITY
First Named Inventor/Applicant Name:	Stephen Barbour
Customer Number:	130443
Filer:	Robert Anton Nissen
Filer Authorized By:	
Attorney Docket Number:	91A-3US
Receipt Date:	06-JAN-2020
Filing Date:	08-AUG-2019
Time Stamp:	13:52:46
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1980
RAM confirmation Number	E202016D54189373
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	Miscellaneous Incoming Letter	notice_of_insufficiency.pdf	88128 513e47dfbdb63b6ce271d1b1a690a77416cc52d4	no	2
Warnings:					
Information:					
2	Transmittal Letter	dec_signed2.pdf	131745 a30535b2eef1184c3d53f954279a3941d75d63dd	no	2
Warnings:					
Information:					
3	Power of Attorney	poa_signedi.pdf	369487 1b2e0048ea4e69908de2d16153b94463283446cc	no	2
Warnings:					
Information:					
4	Assignee showing of ownership per 37 CFR 3.73	373_completedi.pdf	120643 77d551d8a6833adf945471a9680088da3fddfe82	no	3
Warnings:					
Information:					
5	Transmittal Letter	response_91A-3US.pdf	84278 b98d66679139248ff6f72ebf63eaae86043c6fd1	no	8
Warnings:					
Information:					
6	Transmittal Letter	Assignment_signed_pctii.pdf	189410 0356b97eba4285538ade104f4ad862947041fb80	no	1
Warnings:					
Information:					

7	Fee Worksheet (SB06)	fee-info.pdf	38780 113c3ee1eb6b0a023dc13c1b1744cd12f41baa00	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	1022471	

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.

REÇU/RECEIVED
14 -11- 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

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

U.S. APPLICATION NO.	FIRST NAMED INVENTOR	ATTY. DOCKET NO.
16/484,728	Stephen Barbour	91A-3US

130443
Nissen Patent Law
#200, 10328- 81 Ave
Edmonton, AB T6E1X2
CANADA

INTERNATIONAL APPLICATION NO.	
PCT/CA2018/050135	
I.A. FILING DATE	PRIORITY DATE
02/06/2018	02/08/2017

CONFIRMATION NO. 1944
371 FORMALITIES LETTER

OC000000112368307

Date Mailed: 11/05/2019

Notification of Insufficiency Under 37 CFR 1.492 and/or 1.495 (DO/EO/US)

The following items have been submitted by the applicant or the International Bureau to the United States Patent and Trademark Office as a Designated / Elected Office (37 CFR 1.495).

- Indication of Small Entity Status
- Priority Document
- Copy of the International Application filed on 08/08/2019
- Copy of the International Search Report filed on 08/08/2019
- U.S. Basic National Fees filed on 08/08/2019
- Authorize Access to Search Results filed on 08/08/2019
- Priority Documents filed on 08/08/2019
- Specification filed on 08/08/2019
- Claims filed on 08/08/2019
- Abstracts filed on 08/08/2019
- Drawings filed on 08/08/2019
- Authorization to Permit Access filed on 08/08/2019
- Application Data Sheet (37 CFR 1.76) filed on 08/08/2019

The following items **MUST** be furnished within the period set forth below:

- Additional claim fees of **$1710** as a small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.

SUMMARY OF FEES DUE:

Total additional fees required for this application is **$1710** for a Small Entity:

- Total additional claim fee(s) for this application is **$1710**
  - **$1300** for **26** total claims over 20.
  - **$410** for multiple dependent claim surcharge.

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.495(c).

FORM PCT/DO/EO/923 (371 Formalities Notice)

- Properly executed inventor's oath or declaration for the following inventor(s) has not been submitted: **Stephen Barbour**

ALL OF THE ITEMS SET FORTH ABOVE MUST BE SUBMITTED WITHIN TWO (2) MONTHS FROM THE DATE OF THIS NOTICE. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.

The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.
https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

DIAN S GORDON

Telephone: (571) 272-3915

FORM PCT/DO/EO/923 (371 Formalities Notice)

PTO/AIA/01 (06-12)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

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

Title of Invention	BLOCKCHAIN MINE AT OIL OR GAS FACILITY

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 16484728 filed on August 8, 2019.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Stephen Barbour Date (Optional): October 11, 2019

Signature: SE Barbour

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

Privacy Act Statement

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

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

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

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
Alexandria, Virginia
U.S.A.

USSN:
Title: BLOCKCHAIN MINE AT OIL OR GAS FACILITY
First-named inventor: Stephen Barbour
Filing date: August 8, 2019
Attorney Docket No.: 91A-3US

In response to the notice of insufficiency dated November 5, 2019, please amend the above identified application as follows:

Amendments to the claims are contained in the listing of claims which begins on page 2 of this paper.

Remarks/arguments begin on page 8 of this paper.

Amendments to the claims:

The listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Original) A system comprising:
a source of combustible gas produced from an oil production, storage, or processing facility;
a generator connected to the source of combustible gas; and
a blockchain mining device connected to the generator.

2. (Original) The system of claim 1 isolated from a sales gas line and an external electrical power grid.

3. (Currently Amended) The system of claim 1 ~~of any one of claim 1 - 2~~ in which:
the oil production, storage, or processing facility comprises a remote oil well;
the source of combustible gas comprises the remote oil well; and
the remote oil well is connected to produce a continuous flow of combustible gas to power the generator.

4. (Original) The system of claim 3 further comprising a combustion engine connected to the source of combustible gas and connected to drive the generator.

5. (Original) The system of claim 4 in which the combustion engine is a prime mover that is connected to produce oil from the remote oil well.

6. (Original) The system of claim 4 in which the combustion engine is a first combustion engine, and further comprising a second combustion engine that is a prime mover that is connected to produce oil from the remote oil well.

7. (Currently Amended) The system of claim 1 ~~of any one of claim 1 - 6~~ in which:
the oil production, storage, or processing facility comprise an oil storage or processing unit;
the source of combustible gas comprises the oil storage or processing unit, which has a gas outlet connected to supply combustible gas to operate the generator; and

the oil storage or processing unit is connected to receive oil produced from a remote oil well.

8. (Currently Amended) The system of claim 1 ~~of any one of claim 1 - 7~~ in which the generator and blockchain mining device are located adjacent to the oil production, storage, or processing facility.

9. (Currently Amended) The system of claim 1 ~~of any one of claim 1 - 8~~ in which the oil production, storage, or processing facility comprises a remote oil well, which comprises a plurality of remote oil wells, and one or both of the following conditions are satisfied:

the plurality of remote oil wells are located on a multi-well pad; or

the plurality of remote oil wells include a satellite well.

10. (Currently Amended) The system of claim 1 ~~of any one of claim 1 - 9~~ in which:

the blockchain mining device has a network interface and a mining processor;

the network interface is connected to receive and transmit data through the internet to a network that stores or has access to a blockchain database; and

the mining processor is connected to the network interface and adapted to mine transactions associated with the blockchain database and to communicate with the blockchain database.

11. (Original) The system of claim 10 in which:

the network is a peer to peer network;

the blockchain database is a distributed database stored on plural nodes in the peer to peer network; and

the blockchain database stores transactional information for a digital currency.

12. (Currently Amended) The system of claim 10 ~~of any one of claim 10 - 11~~ in which a controller is connected to modulate a power load level exerted by the blockchain mining device on the generator, by increasing or decreasing the mining activity of the mining processor.

13. (Original) The system of claim 12 in which:

the mining processor comprises a plurality of mining processors; and

the controller is connected to modulate the maximum power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining transactions.

14. (Original) The system of claim 13 in which:

the oil production, storage, or processing facility comprises a remote oil well;

the source of combustible gas comprises the remote oil well, which is connected to produce a continuous flow of combustible gas to operate the generator.

15. (Original) The system of claim 14 in which the controller is connected to modulate the power load level in response to variations in a production rate of combustible gas from the remote oil well.

16. (Currently Amended) The system of claim 14 ~~of any one of claim 14 - 15~~ in which:

a production rate of combustible gas from the remote oil well varies between a daily minimum production rate and a daily maximum production rate; and

while the production rate is above the daily minimum production rate, the controller is set to limit the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate.

17. (Original) The system of claim 16 in which the controller is set to divert to a load bank excess electricity produced by the generator.

18. (Currently Amended) The system of claim 14 ~~of any one of claim 14 - 15~~ in which:

a production rate of combustible gas from the remote oil well varies between a daily minimum production rate and a daily maximum production rate;

the controller is set to limit the power load level to above a power level producible by the generator when the production rate is at the daily minimum production rate; and

a backup source, of fuel or electricity, is connected make up a shortfall in fuel or electricity, respectively, required to supply the blockchain mining device with the power load level.

19. (Currently Amended) The system of claim 1 ~~of any one of claim 1 - 18~~ in which a controller is connected to operate a cooling system to maintain the blockchain mining device within a predetermined operating range of temperature.

20. (Currently Amended) The system of claim 1 ~~of any one of claim 1 - 19~~ in which the blockchain mining device is mounted on a skid or trailer.

21. (Original) The system of claim 20 in which the skid or trailer comprises a generator driven by an engine, which is connected to the source of combustible gas.

22. (Original) The system of any claim 21 in which the engine comprises a turbine.

23. (Currently Amended) The system of claim 1 ~~of any one of claim 1 - 22~~ in which the blockchain mining device comprises an intermodal transport container.

24. (Original) A method comprising using a source of combustible gas produced at a hydrocarbon production well, storage, or processing facility, to produce electricity to operate a blockchain mining device located at the hydrocarbon production well, storage, or processing facility, respectively.

25. (Original) The method of claim 24 further comprising, prior to using the source of combustible gas:

disconnecting the source of combustible gas from a combustible gas disposal device at the hydrocarbon production well, storage, or processing facility; and

connecting the source of combustible gas to operate the blockchain mining device.

26. (Currently Amended) The method of claim 24 ~~of any one of claim 24 - 25~~ further comprising:

connecting the source of combustible gas to operate the blockchain mining device; and

diverting gas from a combustible gas disposal or storage device to operate the blockchain mining device.

27. (Currently Amended) The method of claim 25 ~~of any one of claim 25 - 26~~ in which the combustible gas disposal or storage device comprises one or more of a flare, a vent to the atmosphere, an incinerator, or a burner.

28. (Currently Amended) The method of claim 24 ~~of any one of claim 24 - 27~~ in which the hydrocarbon production well, storage, or processing facility comprises an oil or gas well that is isolated from a sales gas line and an external electrical power grid.

29. (Currently Amended) The method of claim 24 ~~of any one of claim 24 - 28~~ in which the source of combustible gas is a remote oil or gas well, and further comprising producing a continuous flow of combustible gas to power a generator connected to operate the blockchain mining device.

30. (Original) The method of claim 29 in which producing further comprises supplying combustible gas to a combustion engine that is connected to drive the generator.

31. (Original) The method of claim 30 in which the source of combustible gas is a remote oil well, and further comprising using the combustion engine as a prime mover to produce oil from the remote oil well.

32. (Original) The method of claim 31 in which, prior to using the source of combustible gas, the combustion engine is under loaded as the prime mover, and further comprising connecting the generator to a power takeoff connected to the combustion engine.

33. (Original) The method of claim 30 in which the combustion engine is a first combustion engine, and further comprising:

prior to supplying combustible gas to the first combustion engine, connecting the first combustion engine to receive combustible gas from the remote oil well; and

using a second combustion engine as a prime mover to produce oil from the remote oil well.

34. (Currently Amended) The method of claim 29 ~~of any one of claim 29 - 33~~ further comprising operating the blockchain mining device to:

mine transactions with the blockchain mining device; and

communicate wirelessly through the internet to communicate with a blockchain database.

35. (Original) The method of claim 34 further comprising modulating, using a controller, a power load level exerted by the blockchain mining device on the generator, by increasing or decreasing a mining activity of the blockchain mining device.

36. (Original) The method of claim 35 in which:

the blockchain mining device comprises a plurality of mining processors; and

modulating comprises modulating the power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining transactions.

37. (Original) The method of claim 36 in which modulating comprises modulating the power load level in response to variations in a production rate of combustible gas from the remote oil or gas well.

38. (Currently Amended) The method of claim 36 ~~of any one of claim 36 - 37~~ in which:

a production rate of combustible gas from the remote oil or gas well varies between a daily minimum production rate and a daily maximum production rate; and

modulating comprises limiting, while the production rate is above the daily minimum production rate, the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate.

39. (Original) The method of claim 38 further comprising diverting to a load bank excess electricity produced by the generator.

40. (Currently Amended) The method of claim 36 ~~of any one of claim 36 - 37~~ in which:

a production rate of combustible gas from the remote oil or gas well varies between a daily minimum production rate and a daily maximum production rate;

modulating comprises limiting the power load level to above a power level produced by the generator when the production rate is at the daily minimum production rate; and

supplying from a backup fuel or electricity source a shortfall in fuel or electricity, respectively, required to supply the blockchain mining device with the power load level.

41. (Original) The method of claim 40 in which the power load level is limited to above a power level produced by the generator when the production rate is at the daily maximum production rate.

REMARKS/ARGUMENTS

Claim amendment

Claims 1 - 41 have been amended to remove all multiple dependencies to reduce excess claim fees.

Excess claim fees, an assignment, declaration, power of attorney and a 3.73 form are submitted along with this response.

Examination of the application is respectfully requested.

January 6, 2020

Respectfully submitted,

/robertnissen#64256/

_____

Robert A. Nissen
Agent of Record
Registration no. 64,256
Customer no. 130443
Telephone 780-802-7904

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

Substitute for Form PTO-1360
(For use with Form PTO/SB/06)

Application Number	Filing Date
16484728	

Applicant(s) Stephen Barbour

* May be used for additional claims or amendments

CLAIMS	AS FILED		AFTER FIRST AMENDMENT		AFTER SECOND AMENDMENT	
	Indep	Depend	Indep	Depend	Indep	Depend
1	1					
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Total Indep	2		0		0	
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Total Claims	46		0		0	

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U.S. APPLICATION NO.	FIRST NAMED INVENTOR	ATTY. DOCKET NO.
16/484,728	Stephen Barbour	91A-3US

130443
Nissen Patent Law
#200, 10328- 81 Ave
Edmonton, AB T6E1X2
CANADA

INTERNATIONAL APPLICATION NO.	
PCT/CA2018/050135	
I.A. FILING DATE	PRIORITY DATE
02/06/2018	02/08/2017

CONFIRMATION NO. 1944
371 FORMALITIES LETTER

OC000000012368307

Date Mailed: 11/05/2019

Notification of Insufficiency Under 37 CFR 1.492 and/or 1.495 (DO/EO/US)

The following items have been submitted by the applicant or the International Bureau to the United States Patent and Trademark Office as a Designated / Elected Office (37 CFR 1.495).

- Indication of Small Entity Status
- Priority Document
- Copy of the International Application filed on 08/08/2019
- Copy of the International Search Report filed on 08/08/2019
- U.S. Basic National Fees filed on 08/08/2019
- Authorize Access to Search Results filed on 08/08/2019
- Priority Documents filed on 08/08/2019
- Specification filed on 08/08/2019
- Claims filed on 08/08/2019
- Abstracts filed on 08/08/2019
- Drawings filed on 08/08/2019
- Authorization to Permit Access filed on 08/08/2019
- Application Data Sheet (37 CFR 1.76) filed on 08/08/2019

The following items **MUST** be furnished within the period set forth below:

- Additional claim fees of $**1710** as a small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.

SUMMARY OF FEES DUE:

Total additional fees required for this application is $**1710** for a Small Entity:

- Total additional claim fee(s) for this application is $**1710**
  - $**1300** for **26** total claims over 20.
  - $**410** for multiple dependent claim surcharge.

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.495(c).

- Properly executed inventor's oath or declaration for the following inventor(s) has not been submitted: **Stephen Barbour**

ALL OF THE ITEMS SET FORTH ABOVE MUST BE SUBMITTED WITHIN TWO (2) MONTHS FROM THE DATE OF THIS NOTICE. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.

The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

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DIAN S GORDON

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FORM PCT/DO/EO/923 (371 Formalities Notice)

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/484,728

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	150		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	260		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	46 minus 20 =	* 26	x 50 =	1300	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*	x 230 =	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))				410			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	2500		TOTAL	

APPLICATION AS AMENDED - PART II

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

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

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

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

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

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/484,728	08/08/2019		930	91A-3US	41	2

CONFIRMATION NO. 1944

130443
Nissen Patent Law
#200, 10328- 81 Ave
Edmonton, AB T6E1X2
CANADA

FILING RECEIPT

OC000000112368306

Date Mailed: 11/05/2019

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)

Stephen Barbour, Lloydminster, CANADA;

Applicant(s)

Upstream Data Inc., Lloydminster, CANADA;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/CA2018/050135 02/06/2018
which claims benefit of 62/456,380 02/08/2017

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

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

If Required, Foreign Filing License Granted: 11/03/2019

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/484,728**

Projected Publication Date: 02/13/2020

Non-Publication Request: No

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

BLOCKCHAIN MINE AT OIL OR GAS FACILITY

Preliminary Class

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

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BLOCKCHAIN MINE AT OIL OR GAS FACILITY

TECHNICAL FIELD

[0001] This document relates to blockchain mining at an oil or gas facility.

BACKGROUND

[0002] At remote oil and gas facilities, excess natural gas is often wasted, for example vented to atmosphere or burned via flaring.

SUMMARY

[0003] A system is disclosed comprising: a source of combustible gas produced from an oil production, storage, or processing facility, such as a remote oil well; a generator connected to the source of combustible gas; and a blockchain mining device connected to the generator.

[0004] A method is disclosed comprising using a source of combustible gas produced at a hydrocarbon production well, storage, or processing facility, to produce electricity to operate a blockchain mining device located at the hydrocarbon production well, storage, or processing facility, respectively.

[0005] A method is disclosed comprising using a source of combustible gas, which is produced from a remote oil or gas well, to produce electricity to operate a blockchain mining device.

[0006] A method is disclosed comprising: disconnecting a source of combustible gas from a gas vent or combustion device at a hydrocarbon production well or processing facility; and connecting the source of combustible gas to produce electricity to operate a blockchain mining device.

[0007] A method is disclosed comprising using a source of combustible gas, which is produced from a remote oil or gas well, to produce electricity to operate a blockchain mining device.

[0008] A method is disclosed of reducing vented or flared natural gas at upstream oil and gas facilities, the method consists of operating a natural gas aspirated prime mover fueled directly by the vented or flared gas source; the prime mover runs a generator to generate power, the generator powers a portable blockchain mine.

[0009] An upstream oil and gas blockchain mining apparatus is disclosed comprising a well, excess gas is captured off the casing of the well to run a natural gas engine, the engine runs both a hydraulic pump and a generator, the generator powers a portable blockchain mine, where the mining load is sized at the low end of the variable availability of gas; excess gas above the amount required to fuel the load is vented, where the mining load is sized at the low end of the variable availability of gas; the prime mover varies its torque

based on the availability of the gas so as to minimize excess vented gas, excess power above the amount necessary to run the mining load is dissipated in a load bank, where the mining load is sized at the high end of the variable availability of gas; and make-up gas is taken from propane tanks on site or from line gas.

[0010] An upstream oil and gas blockchain mining apparatus is disclosed comprising a well, excess gas is captured off the casing of the well to run a prime mover such as an engine, turbine or boiler, the prime mover runs a generator, the generator powers a portable blockchain mine, where the mining load is sized at the low end of the variable availability of gas; excess gas above the amount required to fuel the load is vented, where the mining load is sized at the low end of the variable availability of gas; the prime mover varies its torque based on the availability of the gas so as to minimize excess vented gas, excess power above the amount necessary to run the mining load is dissipated in a load bank, where the mining load is sized at the high end of the variable availability of gas; make-up gas is taken from propane tanks on site or from line gas.

[0011] An upstream oil and gas blockchain mining apparatus is disclosed comprising a multi-well pad or group of satellite wells that produce into an oil treating facility, gas is captured off of the casing of the wells or off of oil and gas separating vessels such as tanks at the treating facility via vapor recovery units or compressors, the gas is used to run a prime mover such as an engine or turbine, the prime mover runs a generator which powers a portable blockchain mine.

[0012] An upstream oil and gas blockchain mining apparatus is disclosed comprising an oil and gas treating facility consists of a flare, incinerator, combustor or burner; excess gas is taken off the inlet line of the flare and redirected to a prime mover such as a natural gas engine, turbine or boiler, the prime mover runs a generator which powers a portable blockchain mining device.

[0013] A portable blockchain mining apparatus is disclosed comprising an enclosure containing the blockchain mining equipment, the enclosure having a ventilation mechanism, to dissipate the heat produced by the mining processors, for example one or more of an air supply fan, an exhaust fan, louvers, and others, the enclosure having a satellite, radio or cellular antenna to provide a connection to the internet, the enclosure containing network equipment such as a modem and network switch, the enclosure designed to be portable such as trailer mounted, the enclosure being insulated from the elements, the enclosure containing a natural gas aspirated engine and a generator to power the mining equipment, and the engine may comprise a turbine, where the enclosure is an intermodal shipping container, where the enclosure has a chiller or air cooling means fitted to it, the enclosure having a back-up heating means, such as a space heater, to be used to pre-heat the enclosure in case of shut down in cold weather.

[0014] In various embodiments, there may be included any one or more of the following features: The oil production, storage, or processing facility comprises a remote oil well. The oil production, storage, or

processing facility comprise an oil storage or processing unit. The system is isolated from a sales gas line and an external electrical power grid. The source of combustible gas comprises the remote oil well; and the remote oil well is connected to produce a continuous flow of combustible gas to power the generator. A combustion engine is connected to the source of combustible gas and connected to drive the generator. The combustion engine is a prime mover that is connected to produce oil from the remote oil well. The combustion engine is a first combustion engine, and further comprising a second combustion engine that is a prime mover that is connected to produce oil from the remote oil well. The source of combustible gas comprises an oil storage or processing unit with a gas outlet connected to supply combustible gas to operate the generator; and the oil storage or processing unit is connected to receive oil produced from a remote oil well. The generator and blockchain mining device are located adjacent to the oil production, storage, or processing facility, for example adjacent to the remote oil well. The remote oil well comprises a plurality of remote oil wells, and one or both of the following conditions are satisfied: the plurality of remote oil wells are located on a multi-well pad; or the plurality of remote oil wells include a satellite well. The blockchain mining device has a network interface and a mining processor; the network interface is connected to receive and transmit data through the internet to a network that stores or has access to a blockchain database; and the mining processor is connected to the network interface and adapted to mine transactions into blocks associated with the blockchain database and to communicate with the blockchain database. The network is a peer to peer network; the blockchain database is a distributed database stored on plural nodes in the peer to peer network; and the blockchain database stores transactional information for a digital currency. A controller is connected to modulate a power load level exerted by the blockchain mining device on the generator, by increasing or decreasing the mining activity of the mining processor. The mining processor comprises a plurality of mining processors; and the controller is connected to modulate the maximum power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining. The source of combustible gas comprises the remote oil well, which is connected to produce a continuous flow of combustible gas to operate the generator. The controller is connected to modulate the power load level in response to variations in a production rate of combustible gas from the remote oil well. A production rate of combustible gas from the remote oil well varies between a daily minimum production rate and a daily maximum production rate; and while the production rate is above the daily minimum production rate, the controller is set to limit the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate. The controller is set to divert to a load bank excess electricity produced by the generator. A production rate of combustible gas from the remote oil well varies between a daily minimum production rate and a daily maximum production rate; the controller is set to limit the power load level to above a power level producible by the generator when the production rate is at

the daily minimum production rate; and a backup source, of fuel or electricity, is connected make up a shortfall in fuel or electricity, respectively, required to supply the blockchain mining device with the power load level. A controller is connected to operate a ventilation, heating and cooling system to maintain the blockchain mining device within a predetermined operating range of temperature. The blockchain mining device is mounted on a skid or trailer. The skid or trailer comprises a generator driven by an engine, which is connected to the source of combustible gas. The engine comprises a turbine. The generator and engine may be mounted integral to the skid, trailer, or blockchain mining device. The blockchain mining device comprises an intermodal transport container. Prior to using the source of combustible gas: disconnecting the source of combustible gas from a combustible gas disposal device at the hydrocarbon production well, storage, or processing facility; and connecting the source of combustible gas to operate the blockchain mining device. Connecting the source of combustible gas to operate the blockchain mining device; and diverting gas from a combustible gas disposal or storage device to operate the blockchain mining device. The combustible gas disposal or storage device comprises one or more of a flare, a vent to the atmosphere, an incinerator, or a burner. The hydrocarbon production well, storage, or processing facility comprises an oil or gas well that is isolated from a sales gas line and an external electrical power grid. The source of combustible gas is a remote oil or gas well, and further comprising producing a continuous flow of combustible gas to power a generator connected to operate the blockchain mining device. Producing further comprises supplying combustible gas to a combustion engine that is connected to drive the generator. The source of combustible gas is a remote oil well, and further comprising using the combustion engine as a prime mover to produce oil from the remote oil well. Prior to using the source of combustible gas, the combustion engine is under loaded as the prime mover, and further comprising connecting the generator to a power takeoff connected to the combustion engine. The combustion engine is a first combustion engine, and further comprising: prior to supplying combustible gas to the first combustion engine, connecting the first combustion engine to receive combustible gas from the remote oil well; and using a second combustion engine as a prime mover to produce oil from the remote oil well. Operating the blockchain mining device to: mine transactions with the blockchain mining device, for example by mining the most recent block on the blockchain with the blockchain mining device,; and communicate wirelessly through the internet to communicate with a blockchain database. Modulating, using a controller, a power load level exerted by the blockchain mining device on the generator, by increasing or decreasing the mining activity of the blockchain mining device, for example the mining activity of plural mining processors contained within the blockchain mining device. The blockchain mining device comprises a plurality of mining processors; and modulating comprises modulating the power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining. Modulating comprises modulating the power load level in response to variations in a production rate of combustible gas from the

remote oil or gas well. A production rate of combustible gas from the remote oil or gas well varies between a daily minimum production rate and a daily maximum production rate; and modulating comprises limiting, while the production rate is above the daily minimum production rate, the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate. One or more of: diverting to a load bank excess electricity produced by the generator; or diverting, to a combustible gas disposal or storage device, excess combustible gas supplied to operate the generator. A production rate of combustible gas from the remote oil or gas well varies between a daily minimum production rate and a daily maximum production rate; and modulating comprises limiting the power load level to above a power level produced by the generator when the production rate is at the daily minimum production rate; and supplying from a backup fuel or electricity source a shortfall in fuel or electricity, respectively, required to supply the blockchain mining device with the power load level. The power load level is limited to above a power level produced by the generator when the production rate is at the daily maximum production rate. The blockchain mining device may be replaced by a suitable mining device or data center. The prime mover is connected to drive a pump jack or a rotating drive head mounted to the remote oil well. The power unit comprises a generator driven by a power take off from the prime mover. A compressor is connected to pressurize natural gas supplied from the source of natural gas to the power unit. The source of combustible gas comprises raw natural gas. The remote oil well comprises a plurality of remote oil wells. The network interfaces comprises one or more of a satellite, cellular, or radio antenna, connected to a modem. Successfully mining a block by a mining processor provides a reward of the digital currency, and the reward is assigned to a digital wallet or address stored on a computer readable medium. Prior to using the source of combustible gas, disconnecting the source of combustible gas from a gas vent or combustion device; and connecting the source of combustible gas to operate the blockchain mining device. The source of vented or flared natural gas is derived from combustible vapors produced as a result of oil treating or processing, such as an oil storage tank, separating vessel, or a free water knockout. The source of vented or flared natural gas is sourced from the inlet line of a flare, incinerator, combustor or burner. Retrofitting an existing natural gas engine running a hydraulic pump to also run a generator, the generator powering a portable blockchain mine. Adding secondary prime movers such as natural gas internal combustion engines, turbines or boilers to run associated generators, the generators powering a portable blockchain mine. The mining load is sized at the low end of a variable vented or flared gas supply such that back-up fuel requirement usage is minimized, the excess gas over and about the amount required to fuel the mining load is vented or flared (combusted). The mining load is sized at the low end of a variable vented or flared gas supply such that back-up fuel requirement usage is minimized, the engine is controlled to throttle up or down based on the availability of excess gas so as to produce more torque, the additional torque

generates excess power above that required to run the mining load, the excess power is directed to a load bank and dissipated as heat, and thus venting is minimized. The electrical load (of the mining hardware) is sized at the high end of a fluctuating excess or stranded gas supply such that venting or flaring is minimized or eliminated, where shortages in gas supply are made up from available back-up fuel such as propane or line gas. Changing the blockchain mine electrical load over time in response to changes in the excess or stranded gas volume availability. The mining load can be changed through the addition or removal of mining processors. Minimizing the vented or flared gas volumes by changing the mining hardware load in reaction to observed changes in average natural gas source rates over time. Minimizing the consumed back up fuel volumes by changing the mining hardware load in reaction to observed changes in average natural gas source rates over time.

[0015] These and other aspects of the device and method are set out in the claims, which are incorporated here by reference.

BRIEF DESCRIPTION OF THE FIGURES

[0016] Embodiments will now be described with reference to the figures, in which like reference characters denote like elements, by way of example, and in which:

[0017] Fig. 1 is a schematic illustrating a system for powering a blockchain mine at a remote oil well using a generator retrofitted to a prime mover, which operates a drivehead to pump oil up from the reservoir.

[0018] Fig. 2 is a schematic illustrating another embodiment of a system for powering a blockchain mine at a remote oil well, with a prime mover (engine) operating the drivehead, and another engine and generator connected to the remote well for powering the blockchain mine independent of the prime mover that operates the drive head.

[0019] Fig. 3 is a schematic illustrating another embodiment of a system for powering a blockchain mine, in which a generator and engine are connected to be powered by combustible gas taken off of an oil storage unit to power the blockchain main.

[0020] Fig. 4 is a schematic depicting a blockchain mining device with a plurality of mining processors and associated control and network equipment housed within a portable enclosure.

[0021] Fig. 5A is a graph that illustrates short-term changes in available natural gas produced over time by an oil production, storage, or processing facility.

[0022] Fig. 5B is a graph that illustrates long-term changes in available natural gas produced over time by an oil production, storage, or processing facility.

[0023] Fig. 6 is a perspective view of an intermodal shipping container housing blockchain mining equipment for use at a remote oil or gas production, storage, or processing facility.

[0024] Figs. 6A, 6B, and 6C are diagrams that illustrate a) a peer-to-peer network, b) a layout of hardware forming a single node in the peer-to-peer network, and c) a conceptual illustration of a blockchain database stored on an individual node, respectively.

DETAILED DESCRIPTION

[0025] Immaterial modifications may be made to the embodiments described here without departing from what is covered by the claims.

[0026] Natural gas is a naturally occurring combustible gas, often in the form of a mixture of hydrocarbon gases that is highly compressible and expansible. Methane (CH_4) is the chief constituent of most natural gas (constituting as much as 85% of some natural gases), with lesser amounts of ethane, propane, butane, and pentane. Impurities may also be present in large proportions, including carbon dioxide (CO_2), helium, nitrogen, and hydrogen sulfide (H_2S).

[0027] Natural gas may be produced from various sources. Natural gas may naturally separate from the oil stream as it is produced up the well and may be captured off the casing side of the well, the casing side referring to the annular space between the production tubing and the well bore or well casing if present. When natural gas is produced from an underground reservoir, it may be saturated with water vapor and may contain heavy hydrocarbon compounds as well as nonhydrocarbon impurities. Natural gas produced from shale reservoirs is known as shale gas. The composition of the gas stream is a function of the thermal maturity of the rock. Thermally immature rocks will contain heavier hydrocarbon components and may contain liquid components. Overmature reservoirs may contain appreciable quantities of CO_2. Natural gas may also be liberated out of solution from the oil as it is treated, such as in a tank on the well site or as it is undergoes further refinement at a downstream facility. In upstream production of oil and gas, natural gas may be produced as the primary product, for example from a gas well, or as a by-product of oil production, for example from an oil well.

[0028] Natural gas produced as a by-product of oil production may be used in various ways. The oil well operator may attempt to capture the gas and consume it, for example as on-site fuel for equipment or for instrumentation pressure. If there is an excess of natural gas that cannot be used on site, it may be desirable to sell the excess by tying the source into a pipeline network with a sales line to sell to a customer connected to the pipeline network. If the amount of gas is significant, it can be compressed or liquefied into storage vessels

to be sold to market. If there is no pipeline network but there is a power grid, the operator may have the option to use the gas to generate electricity to sell to the power grid owner.

[0029] Raw natural gas may require processing before it can be sold via a sales gas line. In long distance transmission of sales gas by pipeline, the pressure is usually less than 1,000 pounds per square inch gage (PSIG). It is important that no liquids form in the line because of condensation of either hydrocarbons or water. Hydrocarbon liquids reduce the pipeline efficiency and might hold up in the line to form liquid slugs, which might damage downstream compression equipment. Condensed water can do the same damage. Additionally, water may form solid complexes (hydrates), which accumulate and block the line. Further, it may be economical to extract liquefiable hydrocarbon components, which would have a higher market value on extraction as compared with their heating value if left in the gas.

[0030] The end user of natural gas needs to be assured of two conditions before committing to the use of gas in a home or factory: the gas must be of consistent quality, meeting sales gas specifications, and the supply of gas must be available at all times at the contracted rate. Gas treating facilities, therefore, must be designed to convert a particular raw gas mixture into a sales gas that meets the sales-gas specifications, and such facilities must operate without interruption. Typical processing steps include inlet separation, compression, gas sweetening, sulfur recovery or acid gas disposal, dehydration, hydrocarbon dewpoint control, fractionation and liquefied petroleum gas (LPG) recovery, and condensate stabilization. Sales gas specifications may vary by jurisdiction, although Table 1 below illustrates a typical specification. A sales gas line may be a pipeline of more than ten km of length, in some cases more than fifty, a hundred, or two hundred, kilometers in length, and connecting between an oil and gas site and travelling to an end user, a processing site, or a distribution site.

[0031] Table 1: Typical Sales Gas Specification

Component	Sales Gas Specification (maximum limits)
H2S (ppm)	10-16
O2 (mol. %)	0.0
CO2 (mol. %)	2-3
Moisture (mg/L and lb/mmscf)	0.1-.16 (4-10)

[0032] A source of natural gas may be located at a remote oil and gas site, for example one that is lacking in accessible infrastructure such as an external pipeline network (sales line) or external power grid to sell into. In many locations it may not be economically feasible to build the infrastructure required to take the produced gas, or resultant electricity generated by combustion of the gas, to market, for example due to

significant capital expense required or when the volume of gas is insufficient to pay out the investment. In such cases, the operator is forced to do something with the excess or stranded gas and is left with few options. Such options currently include venting the gas to atmosphere un-combusted, combusting the gas on site via flare, incinerator, or combustor, or worst case scenario ceasing production of the gas source, for example shutting in the oil well.

[0033] Venting excess gas to atmosphere is the most cost effective option for the operator but may have the most negative impact on the environment, as excess natural gas is regarded as 25-35 times worse than CO_2 as a greenhouse gas on a 100 year global warming potential timescale. Currently, venting gas to atmosphere is a common occurrence in oil production all over the world, as few jurisdictions restrict this practice.

[0034] Combustion disposal options, while more environmentally friendly than venting, represent a significant capital expense and do not provide utility for the operator. Combustion options include, but are not limited to, flaring and incineration. Combustion disposal methods produce waste heat and essentially represent waste of the potential energy of the gas. Such options may represent a capital liability to the operator, as such do not generate any revenue. Both combustion and venting can pose health concerns to nearby residents and are typically considered a nuisance.

[0035] Selling excess gas to a pipeline, i.e. a sales gas line, or using the gas to generate electricity to sell to an external power grid may be ideal options, but such options may require a significant capital expense when there is no infrastructure nearby. To pay off the capital expense, the volume of excess gas must be significant and the supply must also be guaranteed for the payout period. This is often not the case in many upstream oil production activities, as gas volumes associated with oil production can quickly diminish. Many remote oil and gas sites are located in unpopulated areas that are hundreds of kilometers outside of the nearest town, and of which no viable sales option is economically feasible.

[0036] An external power grid may be an electrical power transmission system comprising overhead or underground wiring, often supplying electricity in polyphase form, and spanning an electrical substation to an oil and gas site. Long-distance electricity transmission is typically carried with high voltage conductors. Transmission lines traverse large regions and require numerous support towers, often spanning hundreds of kilometers from generation to distribution and end use. Substations transform power from transmission voltages to distribution voltages, typically ranging from 2400 volts to 37,500 volts.

[0037] Referring to Figs. 1-3, a system 10 is illustrated comprising a source of combustible gas, for example natural gas or another hydrocarbon gas, produced from a hydrocarbon production, storage, or processing facility, in this case a remote oil well 14, a power unit such as a generator 28, and a blockchain

mining device 12. The generator 28 is connected to produce electricity from the source of natural gas. The data mining or blockchain mining device 12 is connected to the generator 28, for example connected to receive electricity from or be powered by the generator 28. Referring to Fig. 2, an oil well 14 may include a suitable production tree 110, which may include a drivehead 16, a stuffing box 114, a flow tee 117, and a casinghead 15, all mounted on a wellhead 116.

[0038] Referring to Figs. 1-3, the remote oil or gas well 14 may be isolated from one or more of a sales gas line or external power grid. Isolated may refer to the fact the no sales gas line or external power grid, as the case may be, is located within a distance that would be economically feasible to connect into, for example such infrastructure may be more than five, ten, fifty, or a hundred kilometers away. Oil and gas production, storage, and processing assets are often distributed across remote locations. For example, well-sites can be remote and isolated from conventional communications equipment making the retrieval of well-site data difficult and unreliable. Some locations can be so remote, that periodic on-site visits are required to manually or semi-manually retrieve data. Some locations are only accessible via off-road vehicles or helicopter.

[0039] Referring to Figs. 1-2, the combustible gas used in the systems and methods in this document may be natural gas, such as raw natural gas and/or casing gas. Casing gas, also known as casinghead gas, is gas produced as a byproduct from a producing oil well 14. Referring to Fig. 1, casing gas is taken from the well 14 through the casinghead 15 at the top of the well 14. The casinghead 15 is in fluid communication with the annulus defined between the production tubing and the well bore or well casing lining the well bore. The casinghead may feed raw natural gas via supply line 41 to a gas tree 22, which may distribute the gas to the various pieces of equipment on site that may use or dispense of the gas. Raw gas may be a gas directly produced from the well, or otherwise unprocessed. Raw gas may contain natural gas liquids (condensate, natural gasoline, and liquefied petroleum gas), water, and some other impurities such as nitrogen, carbon dioxide, hydrogen sulfide and helium.

[0040] Referring to Figs. 1-3, the generator 28 and blockchain mining device 12 may be positioned at a suitable location relative to the hydrocarbon well, storage site, or processing facility, such as remote oil well 14. The generator 28 and blockchain mining device 12 may be located adjacent to the remote oil well 14, for example within one hundred meters. The generator 28 and blockchain mining device 12 may be located further distances away, for example within one kilometer of the remote oil well 14. Relatively longer distances may permit the device 12 to be powered by combustion of gas from plural wells 14 as described below.

[0041] Referring to Figs. 1-2, as above, system 10 may be located at a remote oil well. In the examples shown, the source of combustible gas comprises the remote oil well, 14. As the source of gas the remote oil well 14 may be connected to produce a continuous flow of combustible gas to power the generator 28, for example by supply of combustible gas to a combustion engine 24 that is connected to drive the generator 28.

[0042] Referring to Fig. 1, at a remote oil well site an internal combustion engine 24, such as a motor, may be set up to operate as, or to drive, a prime mover, such as a pump jack or rotating drivehead 16, which is connected to produce oil from the remote oil well 14. A prime mover in this document refers to any machine that converts energy from a source energy into mechanical energy, as a motive power source providing energy to move the components that pump oil from the well 14. A pumpjack converts the rotary motion of a driveshaft of the engine 24 to a vertical reciprocating motion of a walking beam to raise and lower the pump shaft (polished rod) to operate a downhole pump positioned at the base of production tubing in the well. A rotating drivehead 16 is a top side motor that rotates the polished rod to operate a downhole moineau or progressing cavity pump, which in turn drives oil up the production tubing to surface. Driveheads and pumpjacks are examples of artificial lift systems, other examples of which include bottom hole motors. A rotating drivehead may incorporate a hydraulic motor that is driven by a hydraulic pump 26, which is driven by the prime mover or engine 24, for example via supply and return hydraulic lines 18 and 20. At many remote oil wells 12 the prime mover or engine 24 is connected to receive as fuel natural gas from the source of combustible gas, in this case well 14, for example via gas tree 22 and supply line 54.

[0043] Referring to Fig. 1, the prime mover engine 24 may be connected to drive the generator 28. In one case the generator 28 is connected, in some cases retrofitted, to a power takeoff on the engine 24, such as a drive shaft. In some cases the drive shaft also operates the hydraulic pump 26, or drives the gearbox of a pumpjack. The remote oil well 14 may produce natural gas as a by-product off an annulus of the well 14 or other space between adjacent sections of piping, tubing, and / or casing positioned within the well 14. The generator 28 may be any device that converts mechanical energy to electrical energy, such mechanical energy being converted from energy of combustion of the combustible gas. The engine 24 may be a natural aspirated internal combustion engine. The combination of the generator 28 and the engine 24 may be referred to as a genset or engine-generator. The generator 28 may be an alternator, a gas turbine generator, a boiler coupled with a steam-powered generator, or other suitable devices.

[0044] Referring to Fig. 1, the generator 28 may be used to leverage excess energy available when the prime mover engine 24 is under loaded. For example, an engine 24 may be rated at 60 or higher horsepower, but may actually only require 20-30 horsepower to pump the well 14. In such a case the well 14

is a good candidate for retrofitting a generator 28 to leverage the excess power capacity of the engine 24. The generator 28 may thus be connected, for example through a power takeoff, to the combustion engine 24. In other cases the generator 28 may be connected to a mechanical energy source elsewhere in the existing power train, for example to the gearbox or crank assembly of a pump jack, or to a hydraulic motor connected to the pump 26. In other cases, the well site may have an existing generator 28 in place, for example already connected to be driven by the engine 24, and in such a case the mining device 12 may be connected to such generator 28 to receive power for operations.

[0045] Referring to Fig. 2, the mining device 12 may be powered by a generator 28 that is retrofitted, or already present, at a well site independent of the prime mover engine 24. One or more such components may be housed in an enclosure such as an engine building 50. In the example shown during operation the generator 28 is connected to be driven by an engine 56, referred to as a first engine, while a second engine 24 is present to act as the prime mover to pump the well 14. Prior to using the combustible gas to power the mining device 12, a user may connect the generator 28 to an existing engine 56, or may connect a gen-set comprising engine 56 and generator 28 to the gas supply, such as through lines 43 connected to a gas tree 22 on site. The engine 56 and generator 28, or just the generator 28, may be supplied as part of the mining device 12 in some cases, for example as a skid or trailer-mounted unit, in order to provide a turnkey or plug-and-play system that may be transported to the well 14, hooked up to the gas supply or tree 22, and operated.

[0046] Referring to Fig. 3, the mining device 12 may be powered by gas from a plurality of sources, such as a plurality of remote oil wells 14A-D. The plurality of remote oil wells 14A-D may be located on a multi-well pad 118, for example a plurality of horizontal wells that penetrate the same hydrocarbon reservoir. The plurality of remote oil wells 14A-D may include one or more satellite wells. A satellite well includes a well that is separate from a main group of wells or another well, but whose production is directed to a common processing facility. A satellite well may include a well that penetrates the same hydrocarbon reservoir as other wells in the plurality of wells. Each of the plurality of remote oil wells 14A-D may have respective casinghead gas lines 60 and oil or emulsion lines 58, which in the examples shown are bussed or grouped together, though such grouping is not necessary and in some cases independent lines may be used for each well or a group of one or more wells. The gas supply line or lines 60 may feed an engine 56 that drives a generator 28 that powers a mining device 12.

[0047] Referring to Fig. 3, the source of combustible gas may be an oil storage or processing unit, for example a production storage tank or tanks 34A-B. The tanks 34 may store emulsion, for example a mixture of oil and water, which may be supplied via one or more emulsion or oil lines 58 from wells 14A-D.

The source of natural gas may comprise oil storage production tank 34 connected to receive oil produced from the remote oil well 14. Oil storage production tank 34 may store, and in some cases separate, emulsion 38, which may release vapor such as combustible gas 36 over time. A gas outlet, such as a vapor recovery unit 66, may be connected to supply natural gas from the oil storage production tank 34 to the engine 56. A compressor 62 or other suitable device may be used to pressurize the gas supplied to engine 56. The engine 56 and generator 28 may form a standalone unit or may be connected for other functions on the site, such as to pump a well or power communications or electrical equipment. Pressurized natural gas from compressor 62 may be used to fuel lease equipment 64, such as control equipment, communications equipment, surveillance equipment, heaters, or other components. Excess or unused gas may be directed to a gas disposal or storage device such as an atmospheric vent or combustion device, in this case a flare 68. Gas may be diverted from flare 68 to engine 56 via an excess gas line 70.

[0048] Referring to Fig. 3, in some cases a method of installing the system 10 on site includes reducing the amount of combustible gas that is wasted on site. For example, the method of install may include disconnecting the source of combustible gas, in this case from tanks 34 and/or line 60, from an atmospheric vent or combustion device, in this case flare 68, or to atmosphere via a vent 52 (Fig. 1). The source of combustible gas may be initially connected to operate the blockchain mining device 12. Once disconnected, the atmospheric vent or combustion device may be unused in the future, or may be used only in certain circumstances. In some cases combustible gas is diverted at least partially from the atmospheric vent or combustion device to operate the blockchain mining device 12, so that relatively less gas is wasted during operation. In such cases the flare 68 may remain connected to the source of gas, for example to receive a lesser feed of gas than prior to the installation of mining device 12, and in other cases to receive diverted excess gas in certain circumstances for example as described further elsewhere in this document. An atmospheric vent or combustion device is an example of a gas disposal device, and includes a flare, a vent to the atmosphere, an incinerator, a burner, and other suitable devices.

[0049] A blockchain is a form of database, which may be saved as a distributed ledger in a network of nodes that maintains a continuously-growing list of records called blocks. Each block contains a timestamp and a link to a previous block. The data in a block cannot be altered retrospectively without significant computational effort and majority consensus of the network. The first blockchain was conceptualised by Satoshi Nakamoto in 2008 and implemented the following year as a core component of the digital currency, BITCOIN (TM), where it serves as the public ledger for all transactions. Through the use of a peer-to-peer network and a distributed timestamping server, a blockchain database is managed autonomously. The administration of BITCOIN (TM) currency is currently the primary use for blockchain technology, but there

are other use cases for blockchain technology to maintain accurate, tamper-proof databases. Examples include maintaining records of land titles and historical events. While the potential in blockchain technology is vast, BITCOIN (TM) remains the most widely used today.

[0050] By design blockchains are inherently resistant to modification of the data — once recorded, the data in a block cannot be altered retroactively without network consensus. Blockchains are an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way. The ledger itself can also be programmed to trigger transactions automatically. Blockchains are secure by design and an example of a distributed computing system with high byzantine fault tolerance. Decentralised consensus can therefore be achieved with a blockchain. This makes blockchains suitable for the recording of events, medical records, and other records management activities, identity management, transaction processing and proving provenance. This offers the potential of mass disintermediation and vast repercussions for how global trade is conducted.

[0051] A blockchain facilitates secure online transactions. A blockchain is a decentralized digital ledger that records transactions on thousands of computers globally in such a way that the registered transactions cannot be altered retrospectively. This allows the participants to verify and audit transactions in an inexpensive manner. Transactions are authenticated by mass collaboration powered by collective self-interests. The result is a robust workflow where participants' uncertainty regarding data security is marginal. The use of a blockchain removes the characteristic of infinite reproducibility from a digital asset. It confirms that each unit of digital cash was spent only once, solving the long-standing problem of double spending. Blockchains have been described as a value-exchange protocol. This exchange of value can be completed more quickly, more safely and more cheaply with a blockchain. A blockchain can assign title rights because it provides a record that compels offer and acceptance. From the technical point of view a blockchain is a hashchain inside another hashchain.

[0052] A blockchain database may comprise two kinds of records: transactions and blocks. Blocks may hold batches of valid transactions that are hashed and encoded into a Merkle tree. Each block may include the hash of the prior block in the blockchain, linking the two. Variants of this format were used previously, for example in Git, and may not by itself be sufficient to qualify as a blockchain. The linked blocks form a chain. This iterative process confirms the integrity of the previous block, all the way back to the original genesis block. Some blockchains create a new block as frequently as every five seconds. As blockchains age they are said to grow in height. Blocks are structured by division into layers.

[0053] Sometimes separate blocks may be validated concurrently, creating a temporary fork. In addition to a secure hash based history, each blockchain has a specified algorithm for scoring different

versions of the history so that one with a higher value can be selected over others. Blocks that are not selected for inclusion in the chain are called orphan blocks. Peers supporting the database don't have exactly the same version of the history at all times, rather they keep the highest scoring version of the database that they currently know of. Whenever a peer receives a higher scoring version (usually the old version with a single new block added) they extend or overwrite their own database and retransmit the improvement to their peers. There is never an absolute guarantee that any particular entry will remain in the best version of the history forever, but because blockchains are typically built to add the score of new blocks onto old blocks and there are incentives to only work on extending with new blocks rather than overwriting old blocks, the probability of an entry becoming superseded goes down exponentially as more blocks are built on top of it, eventually becoming very low. For example, in a blockchain using the proof-of-work system, the chain with the most cumulative proof-of-work is always considered the valid one by the network. In practice there are a number of methods that can demonstrate a sufficient level of computation. Within a blockchain the computation is carried out redundantly rather than in the traditional segregated and parallel manner.

[0054] Maintaining a blockchain database is referred to as mining, which refers to the distributed computational review process performed on each block of data in a block-chain. This allows for achievement of consensus in an environment where neither party knows or trusts each other. Those engaged in BITCOIN (TM) mining are rewarded for their effort with newly created BITCOIN (TM)s and transaction fees, which may be transferred to a digital wallet of a user upon completion of a designated task. BITCOIN (TM) miners may be located anywhere globally and may be operated by anyone. The mining hardware is tied to the blockchain network via an internet connection. Thus, little infrastructure is needed to operate and contribute to the system. All that is required to become a BITCOIN (TM) miner is the appropriate computer hardware, an internet connection and low cost electricity. The cheaper the electricity the more reward the miner will receive relative to competition, other miners.

[0055] Mining is the process of adding transaction records to BITCOIN (TM)'s public ledger of past transactions. This ledger of past transactions is called the blockchain as it is a chain of blocks. The blockchain serves to confirm transactions to the rest of the network as having taken place. BITCOIN (TM) nodes use the blockchain to distinguish legitimate BITCOIN (TM) transactions from attempts to re-spend coins that have already been spent elsewhere. Mining may be intentionally designed to be resource-intensive and difficult so that the number of blocks found each day by miners remains steady. Individual blocks may be required to contain a proof-of-work to be considered valid. This proof-of-work is verified by other BITCOIN (TM) nodes each time they receive a block. BITCOIN (TM) uses the hashcash proof-of-work function.

[0056] One purpose of mining is to allow BITCOIN (TM) nodes to reach a secure, tamper-resistant consensus. Mining may also be the mechanism used to introduce BITCOIN (TM)s into the system: Miners are paid any transaction fees as well as a subsidy of newly created coins. This both serves the purpose of disseminating new coins in a decentralized manner as well as motivating people to provide security for the system. BITCOIN (TM) mining is so called because it resembles the mining of other commodities: it requires exertion and it slowly makes new currency available at a rate that resembles the rate at which commodities like gold are mined from the ground.

[0057] Mining requires computational effort in the form of CPU cycles (CPU = central processing unit or central processor) to run a cryptographic hashing algorithm associated with the particular blockchain protocol. For a given mining processor, one can modify the computational effort through changing the core voltage or the clock rate of the processor. Doing so may result in more or less power consumed by the mining processor, and in some embodiments within this document such changes are described as changing the mining activity, or hashrate.

[0058] As the total network computational effort (or hashrate) increases on a blockchain over time, the probability for an individual miner to find a block and receive a reward diminishes. Today the BITCOIN (TM) network is so large that most individuals engaged in mining BITCOIN (TM) typically mine in pools using protocols such as the Stratum Mining Protocol. This allows individual miners to increase their reward frequency as a trade-off for splitting the block reward with the rest of the pool. Miners who are pool mining do not need the associated equipment needed to run a mining node as they only need compute and submit proof-of-work shares issued by the mining pool.

[0059] Since the energy cost of running blockchain mining equipment is its primary operating cost, a trend towards mining on low-cost hydroelectric power has become prevalent. This trend has promoted the centralization of blockchain miners in specific countries with abundant hydroelectric power, as miners who do not have access to cheap hydroelectricity cannot mine profitably because they are competing with the miners who do have access. BITCOIN (TM) mining centralization has been occurring in China where there is abundant low cost hydroelectric power. Centralization in blockchain mining is undesirable because the premise behind the blockchain innovation is not to have to trust a third party and to have inherent confidence and security through a decentralized, distributed network. There exists a need to further decentralize BITCOIN (TM) and other blockchain mining through a more decentralized source of low-cost power.

[0060] Referring to Fig. 6A, a blockchain network may be a peer to peer network 120 accessible via the internet. The blockchain database may be stored as a distributed database 132 on plural nodes 122, for example nodes 122A-F, in the peer to peer network 120. A protocol may be put in place to ensure that each

copy of the database on each node is updated in a reliable fashion when one copy is updated on one node. Each copy of the blockchain database may store transactional information for a digital currency such as BITCOIN (TM). Nodes 122A-F may be electronic devices 126, for example desktop computers, laptop computers, tablet computers, cellular telephones, servers, or other suitable devices. Nodes 122A-F may communicate with one another over wired or wireless communication paths 138, for example through the internet. Each path 138 may be created through communication via switches, routers, modems, and other network equipment. Network 120 may include any number of nodes, for example tens, hundreds, thousands, millions, or more nodes. Nodes 122A-F may communicate to maintain a distributed global ledger of all official transactions. One or more of the nodes 122A-F may store a copy of the global ledger, for example a complete copy of the global ledger or a partial copy of the global ledger.

[0061] Referring to Fig. 6B, each node 122 may correspond to and be defined by a physical device 126, such as a computer. Device 126 may have one or more of storage and processing circuitry 128 and mining circuitry 130 if the node operates as a miner. Storage and processing circuitry 128 may have storage circuitry, for example hard disk drive storage, nonvolatile memory such as flash memory or other electrically-programmable-read-only memory configured to form a solid state drive, or volatile memory such as static or dynamic random-access-memory. Processing circuitry of storage and processing circuitry 128 may be used to control the operation of device 126. Storage circuitry 128 may store one or more copies of a portion or the entirety of the distributed database 132. Such processing circuitry may include suitable hardware components such as microprocessors, microcontrollers, and digital signal processors, or dedicated processing circuits such as application specific integrated circuits. Mining circuitry 130, for example an integrated circuit chip, may be used to perform data mining operations, for example verifying cryptocurrency transactions. Network communication hardware 131 may be used to communicate with other nodes and the network in general.

[0062] Referring to Figs. 6A-B, every transaction added to the global ledger via nodes 122 may be verified by other the other nodes to help ensure validity of the ledger. Successfully mining a block may provide a reward of the digital currency, wherein, the processor circuitry 128 or another processor may assign the reward to a digital wallet or address stored on a computer readable medium.

[0063] Referring to Fig. 6C, storage and processing circuity 128, may maintain or store a blockchain database 132. The blockchain database 132 may store data as a series of interconnected blocks 134, for example blocks 134A-C. Each block 134 may have a respective header and contents and the header may contain the previous block's hash. Such information may be used in linking a new block, for example block 136, into the blockchain database 132. A new block 136 may be added to the chain as transactions are verified and confirmed into the blockchain. The integrity of the blockchain may be verified by known

methods, and the linking of each block to previous blocks acts to create a liable and traceable path of title to anonymously but reliably verify a chain of title for a specific quantity of currency that has been the subject of one or more transactions.

[0064] Referring to Fig. 4, each blockchain mining device 12 may be composed of suitable components. The blockchain mining device 12 may have a network interface, such as network equipment 88, and one or a plurality of mining processors 92 (92A-92E for example). The network interface may be connected to receive and transmit data through the internet to a node on the network 120 (Fig. 6A), or to a mining pool (not shown), that stores or has access to a blockchain database, which may be for a digital currency. The mining processor or processors may be connected to the network interface and adapted to mine new transactions into the blockchain database and to communicate with the blockchain database. Referring to Fig. 4, the network interface or interfaces (network equipment 88) may have a configuration suitable for receiving and transmitting data through the internet to the network. Referring to Fig. 6, a network interface may comprise one or more communication device such as a network antenna 96A, a satellite antenna or dish 96B, a cellular antenna, or a radio antenna. The network equipment 88 may include or be connected to a modem.

[0065] Referring to Fig. 6, system 10 may be mounted within a portable enclosure 98 suitable for transporting blockchain mining device 12 between locations. The blockchain mining device 12 (Fig. 1) may be skid or trailer-mounted. The blockchain mining device 12 may be located in a portable enclosure 98, for example an intermodal transport container as shown. The portable enclosure 98 may have an access door 102 such as a man door, for example to permit entry and exit of a person such as equipment maintenance staff into and out of the enclosure 98. Portable enclosure 98 may have an end gate 100 to permit entry and exit of data mining equipment, for example mining processors 92, or power generating equipment such as engine 56 and generator 28, into and out of the enclosure 98. One or more network communications equipment 96, for example network antenna 96A such as a cellular network antenna or radio network antenna and / or satellite internet dish 96B may be mounted to the enclosure 98, for example to a top side 98A of the enclosure 98 or at another suitable location. Enclosure 98 may have an air supply, such as a centrifugal fan 106, for example driven by a motor 104, in order to cool and ventilate internal components to prevent system downtime or damage from overheating. Enclosure 98 may have one or more exhaust fans 108 and / or louvers, for example to facilitate air flow out of, or into, enclosure 98 for heat dissipation from enclosure 98. Enclosure 98 may have an air supply, such as an air supply fan 106, and may have an air supply filter (not shown) and conditioning equipment such as a dehumidifier (not shown) to provide a quality air supply for the enclosure 98.

[0066] Referring to Fig. 6, an intermodal container is a relatively large rectangular box-shaped standardized shipping container, designed and built for intermodal freight transport, meaning these containers can be used across different modes of transport – from ship to rail to truck – without unloading and reloading their cargo. Intermodal containers are primarily used to store and transport materials and products efficiently and securely in the global containerized intermodal freight transport system, but smaller numbers are in regional use as well. These containers are known under a number of names, such as simply container, cargo or freight container, ISO container, shipping, sea or ocean container, container van or (Conex) box, or seacan. Intermodal containers exist in many types and a number of standardized sizes, but ninety percent of the global container fleet are so-called dry freight or general purpose containers, which are durable closed steel boxes, mostly of either twenty or forty foot standard length. Common heights are 8 feet 6 inches and 9 feet 6 inches– the latter are known as High Cube or Hi-Cube containers. Intermodal containers often include corrugated walls 101 for strength. Each corner of the container may include a twistlock fitting 103 for securing the container to other containers and to various transportation devices such as a container trailer for a road-based tractor unit. Reinforcing beams 105 may span the edges of the container, for example the vertical columns that make up the four corners between sidewalls, and the horizontal beams that make up the longitudinal and lateral side edges of the base of the container.

[0067] Referring to Fig. 4, an example layout is illustrated of the components that may make up a mining device 12. The enclosure 98 may contain one or more of a meter 72, a splitter 74, a ventilation fan 76, a chiller 78, a step-down transformer 80, a distribution panel 82, a contactor panel 84, a controller 86, network equipment 88 such as a modem and a network switch, a thermistor or temperature sensor 90, and one or more mining processors 92 such as processors 92A-E. The generator 28 provides power to the mining device 12. In some cases, the power is metered via meter 72 so the user can know how much to pay the owner of the gas, and then the power may be split up.

[0068] Referring to Fig. 4, the generator 28 may produce polyphaser power, such as three phase power, which may be useful to run large loads such as the ventilation fan 76 and chiller 78. The power may travel into a step-down transformer 80. A transformer 80 may or may not be required depending on what voltage the generator makes. Transformer 80 may convert the input voltage to the required voltage to run the rest of the equipment. The transformer or transformers 80 may also convert the three phase power to single phase power. After the transformer the power may travel into a distribution panel 82. The panel 82 may feed power into the rest of the equipment. A contactor panel 84 may be used to switch on and off various mining processor circuits each connected to one or more mining processors 92. Different mining processor circuits

may be designed for different voltages, as some mining processor power supplies run on 120V, and some run on 208V.

[0069] Referring to Fig. 4, the network equipment 88 block may provide a source of internet connection. A satellite / cellular / and/or radio antenna or other network communication equipment 96 may be fitted on the mining device 12 and connected to a modem. The modem may feed a network switch that has ethernet ports. Each mining processor controller may need one ethernet port. The network connection may also feed a controller or controllers 86, which may be a programmable logic controller (PLC), which may be accessed remotely. The controller 86 may be connected to at least a thermistor 90 (temperature sensor) within the mining device 12, to allow the controller 86 to control the ventilation and chilling loads within the enclosure 98. The controller 86 may control the contactor panel 84 switches to open and close circuits to add or remove mining processors 92 from operation. Each mining processor 92 may have a variety of configurations, but generally may include at least a power supply, a controller board and mining circuitry, such as an ASIC circuit. Various mining circuitry examples include CPU (central processing unit), GPU (graphics processing unit), FPGA (Field-Programmable Gate Array), and ASIC (application specific integrated circuit). The components of an ASIC mining processor include the hash boards (each board has numerous chips that is doing the hashing), a controller (to communicate with the network and optimize the mining processors chip frequency and fans for cooling), and a power supply (typically converts AC input power to DC power for the ASIC). Each mining processor 92 may be positioned on racks or shelving units.

[0070] Referring to Fig. 4, the blockchain mining device 12 may comprise a controller 86 connected to operate one or more aspects of the blockchain mining device 12. The controller 86 may be connected to operate a cooling system, for example having a ventilation fan 76 and a chiller 78, to maintain the mining processor 92 within a predetermined operating range of temperature. For example, if the internal temperature within the mining device 12 spikes above a predetermined maximum predetermined temperature, the air ventilation system may initiate or ramp up, and if the temperature contains past a second, relatively higher maximum predetermined temperature, the chilling unit may initiate or ramp up to achieve an air-conditioning effect. Similarly, if the temperature drops below a minimum predetermined temperature, a heating system (not shown) may initiate that may or may not leverage the air ventilation infrastructure to distribute heat. Plural controllers may be incorporated, for example to carry out different tasks, for example one controller for temperature control and another for mining processor control. The enclosure 98 may be structured to insulate its contents from the elements. The enclosure 98 may have a back-up heating device such as a space heater (not shown), for example to be used to heat the enclosure 98 in case of shut down in cold weather.

[0071] Referring to Fig. 4, one or more controllers 86 may modulate operating power loading to operate within the varying and gradually diminishing gas supply levels provided by a remote oil well or other hydrocarbon production, storage, or processing facility. The controller 86 may be connected to modulate a power load level used by the blockchain mining device 12, for example by increasing or decreasing the mining activity, or hashrate, of the mining processor 92. The mining processor 92 may comprise a plurality of processors, and the controller 86 may be connected to modulate the operating power loading level by increasing or decreasing the number of mining processors 92 that are actively engaged in mining, such as powering down one or more mining processors 92.

[0072] The controller 86 may be connected to modulate the power load level in response to variations in a supply or production rate of natural gas from the source of natural gas, for example a production rate of the well 14. Referring to Fig. 5A, over a relatively short time period, such as a single day, the controller 86 may modulate the power load by modulating the mining activity, or hashrate, of a mining processor 92 to correspond with either or both a) readings from a production rate sensor (not shown), or b) a measured gas production time profile based on recent (for example readings taken over the last week) historical gas production readings taken from the well, such as is shown in Fig. 5A. Thus, as gas production increases, so might the controller 86 increase mining activity, or hashrate, of mining processor 92, thereby drawing more power which results in a larger power load and gas consumption of the engine 56. As gas production decreases as it is known to do in a relatively predictable and cyclical fashion as shown, the mining activity may decrease. Adjustments may be made in real time to maximize the use of the casinghead gas produced and to minimize waste of either electricity generated or excess gas sent to a disposal device.

[0073] Referring to Fig. 5A, in some cases the power load level 152 may be set in relation to a daily minimum production rate 155B of natural gas. A production rate of combustible gas from the remote oil well 14 may vary between a daily minimum production rate 155B and a daily maximum production rate 155A. At least while the production rate is above the daily minimum production rate155B, or for a period of time of eight, twelve, twenty-four, or more hours, the controller 86 may be set to limit the power load level to at or below a power level 152 producible by the generator 28 when the production rate is at the daily minimum production rate. Thus, because the power load level is set to the minimum daily power supply from the generator 28, the controller 86 may retain a stable and consistent number of mining processors 92 in operation all day long. Venting may be decreased and little control philosophy may be required. Such a method may not completely eliminate waste such as venting however waste is reduced.

[0074] Referring to Fig. 1, while the power load level is set to the daily minimum, the excess gas or electricity may be addressed in a suitable fashion. In the example shown, excess electricity produced by the

generator 28 is diverted to an electricity disposal device, in this case a load bank 32 when the production rate is above the daily minimum production rate 155B. In some cases the controller 86 or another suitable device, may divert excess gas from reaching engine 24, for example to a suitable gas disposal or storage device, such as an atmospheric vent, a flare, or other device. One or more valves, such as an instrumented valve, may be used for such diversion. In some cases excess gas sent to the engine will automatically divert to disposal through the gas tree, as such equipment may already have pressure regulation installed and set such that above a certain pressure excess gas is diverted to vent or flare. The load bank may be controlled to load up the engine so that all power generated in excess of the required amount to power the mine can be dissipated in the load bank as heat. In such a fashion the user can eliminate venting altogether as long as the engine is sized to consume the maximum available gas supply.

[0075] Referring to Fig. 5A, in some cases the power load level may be set in relation to a daily maximum production rate 155A of natural gas, with shortfall made up by a backup source of fuel or electricity. Referring to Fig. 1, the controller 86 may be set to limit the power load level 150 to above a power level producible by the generator 28 when the production rate 155 is at the daily minimum production rate 155B. In some cases the power level is set to be limited at least while the production rate 155 is above the daily minimum production rate 155B, or for another suitable time period such as eight, twelve, twenty-four or longer periods of time. The power load level may be set to at, below, or above the maximum power level producible by the generator 28 when the production rate 155 is at the daily maximum production rate 155A. A backup source, of fuel or electricity, in this case one or more of propane tanks 30A, 30B, underground fuel supply line 46, and gas outlet line 42 from production storage tank 34, may be connected make up shortfalls in fuel or electricity, respectively, required to supply the blockchain mining device 12 with the power load level. In such an example vented gas is eliminated but back-up fuel use may be increased, thus operating costs may rise relative to the daily low embodiment (embodiments where power load level is set in relation to the daily minimum production rate 155B in Fig. 5A) because of the requirement for the backup fuel or electricity source.

[0076] On a well site there may be one or more uses for produced gas, and thus the production rate of the well may be higher than the production rate of gas that arrives at the engine 24 or 56, however, due to the varying production rate, the fluctuation in the graph gives an indication of the proportional fluctuation in the actual production rate received by the engine 24 or 56 as the case may be. In some cases the engine 24 or 56 is undersized and cannot consume the maximum available gas, in which case the gas is sent to a gas disposal or storage device via pressure regulation in the gas tree and/or at the engine. The engine may comprise a throttle that permits some variation in gas consumption and power production at the engine level,

and in some cases the controller 86 is set to operate the throttle. In some cases the power load level may be set in between the daily maximum and minimum production rates, with a backup energy or fuel source and a method of disposing or storing of excess gas.

[0077] Referring to Fig. 5B, the graph shows a typical scenario where gas production decreases over time. As the natural gas production rate 155 decreases, individual mining processors 92A-E may be removed or disengaged from the device 12 so that the load on the engine 24 or 56 is reduced correspondingly, thereby reducing the required natural gas consumption of the engine 24 or 56 to match or correspond with the decline in gas availability. Fig. 5B depicts an engine fuel consumption level 154 that is modulated over time in a stepped or stepdown fashion in relation to the gradually decreasing production rate 155 of the well.

[0078] In the claims, the word "comprising" is used in its inclusive sense and does not exclude other elements being present. The indefinite articles "a" and "an" before a claim feature do not exclude more than one of the feature being present. Each one of the individual features described here may be used in one or more embodiments and is not, by virtue only of being described here, to be construed as essential to all embodiments as defined by the claims.

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(54) Title: BLOCKCHAIN MINE AT OIL OR GAS FACILITY

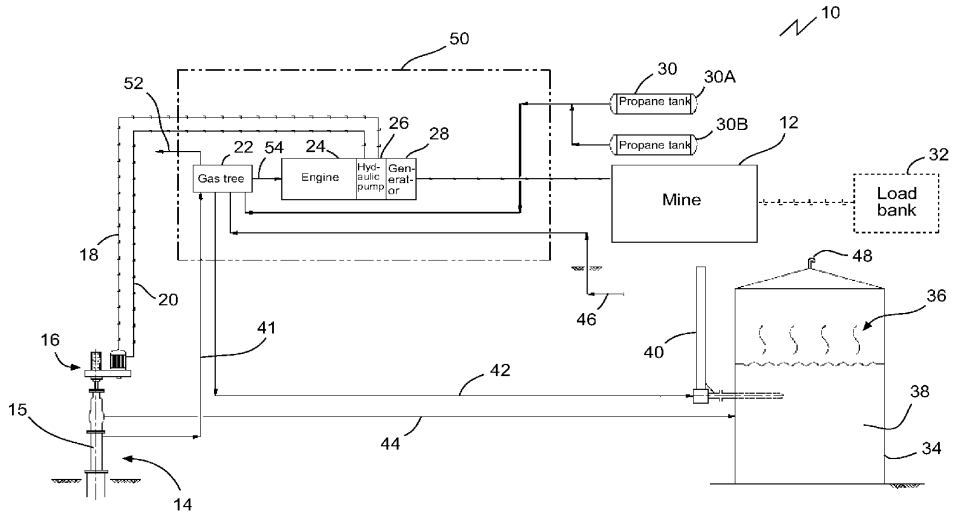


Fig. 1

(57) Abstract: Methods and systems of operating a blockchain mining device using natural gas produced at a hydrocarbon production, storage, or processing site/facility. A generator may be retrofitted to an existing prime mover used to pump the well, and the generator may be used to power the blockchain mining device. Portable mining devices may be hooked up to a casinghead gas supply at a remote, isolated oil facility. Power loading levels may be modulated by adjusting mining transaction levels to correspond with combustible gas production levels.

[Continued on next page]

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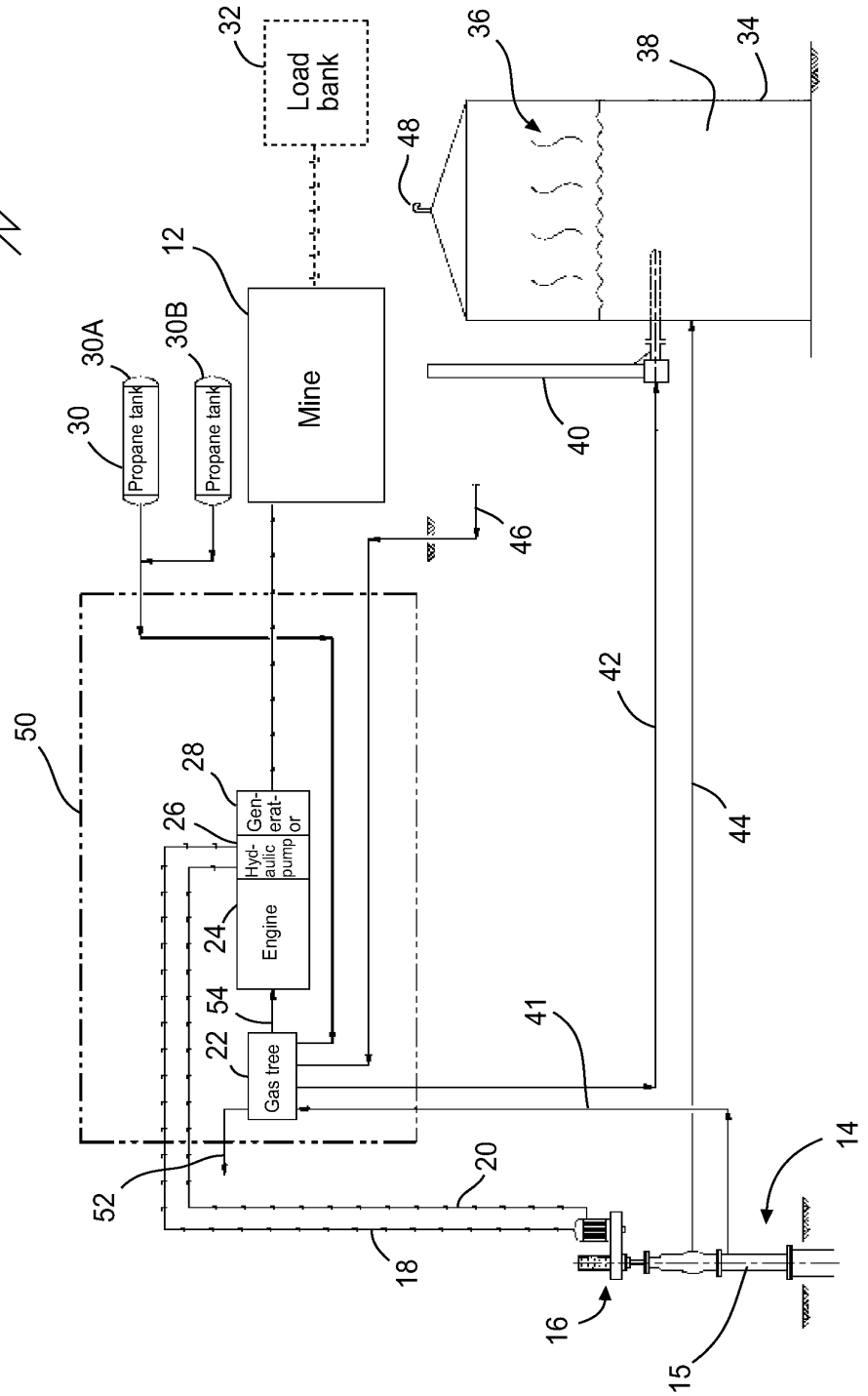

10
12
Mine
30
30A
30B
Propane tank
Propane tank
32
Load bank
34
36
38
40
42
44
46
48
50
52
54
14
15
16
18
20
22
Gas tree
24
Engine
26
Hyd-aulic pump
28
Gen-erat-or
41

Fig. 1

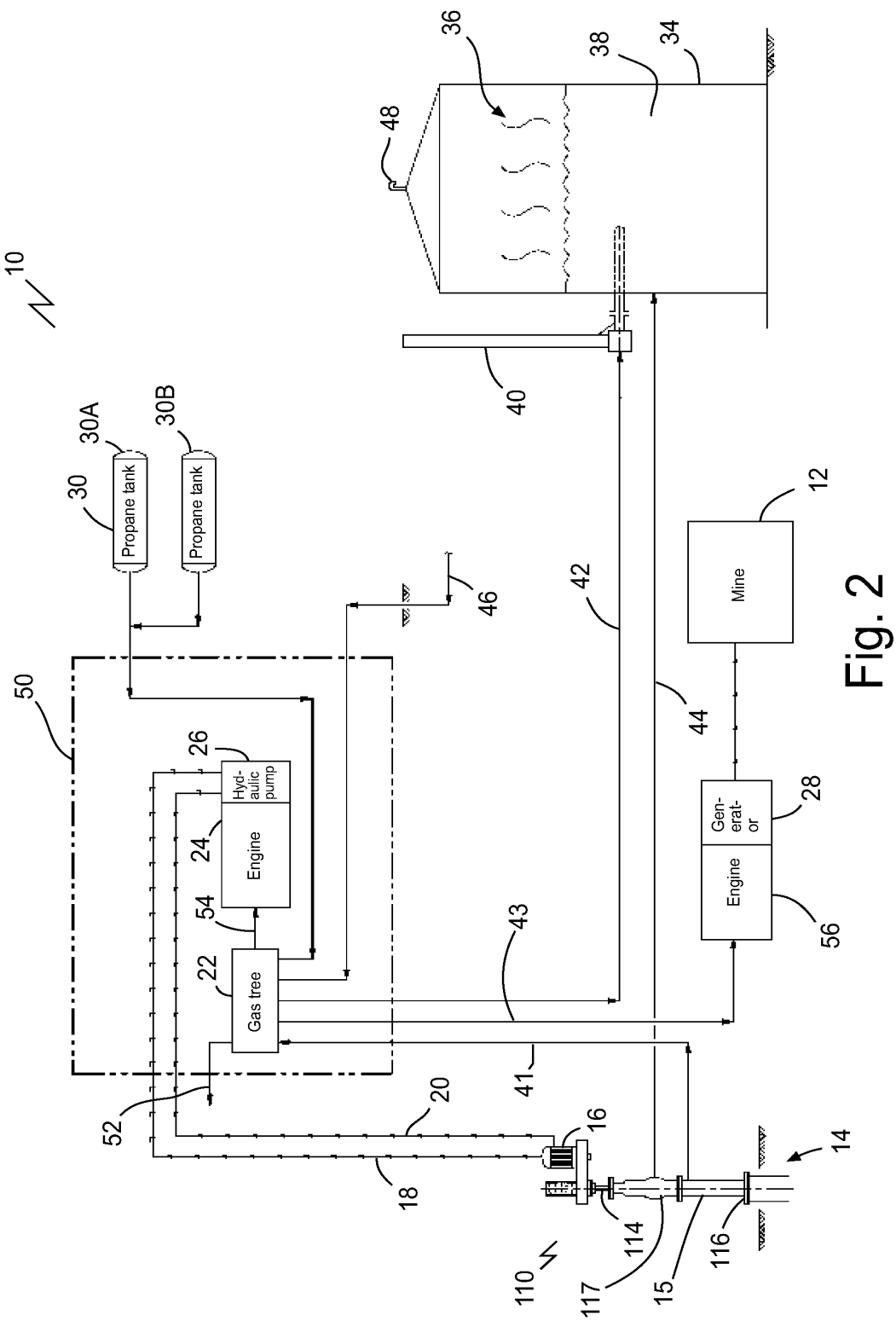

10
36
38
34
48
40
30A
30B
30
Propane tank
Propane tank
46
42
12
Mine
50
26
Hyd-
aulic
pump
24
Engine
54
22
Gas tree
43
44
28
Gen-
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Engine
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52
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41
16
14
18
110
114
117
15
116

Fig. 2

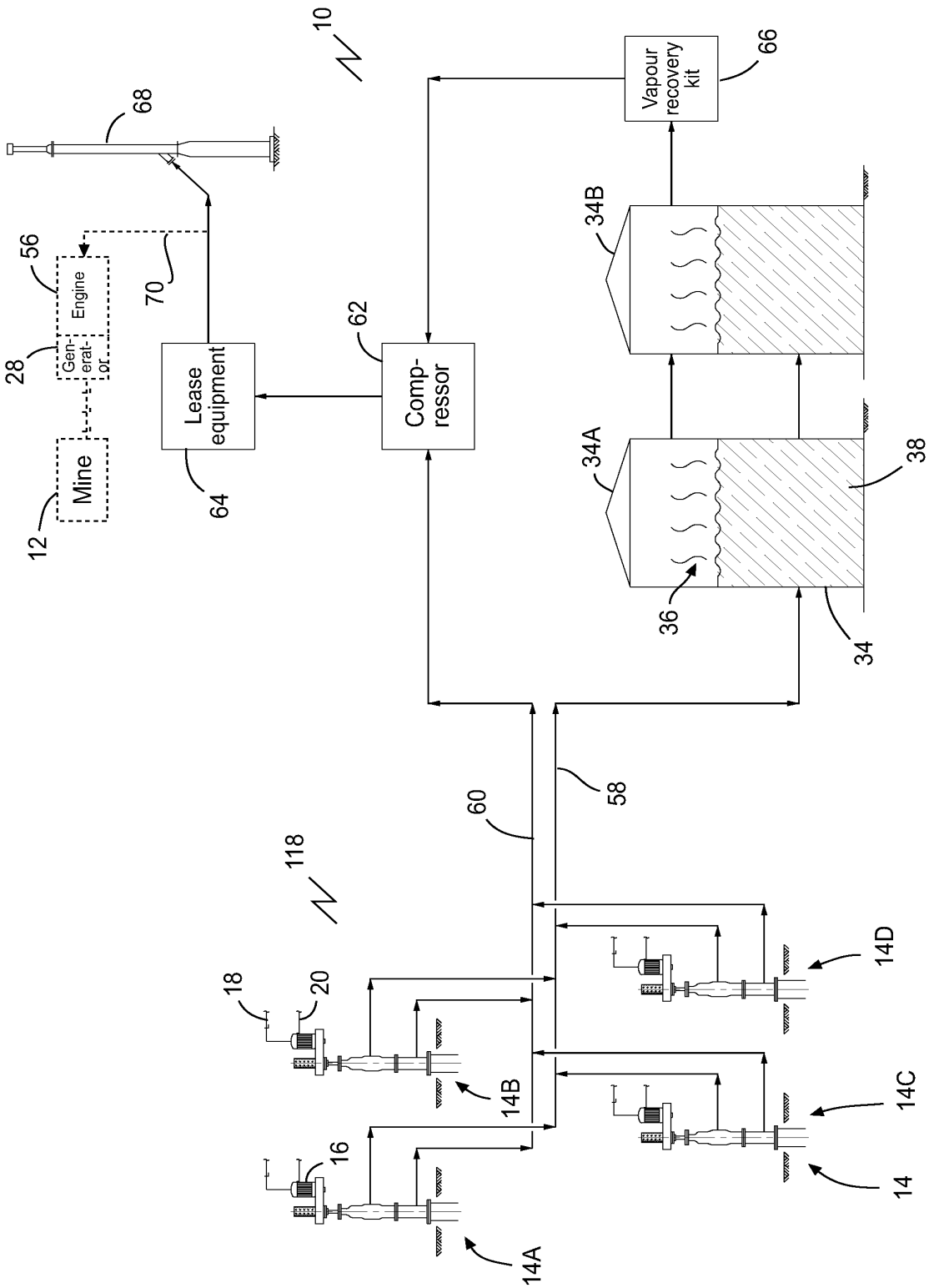

10
68
56
Engine
Gen-
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or
28
Mine
12
70
Lease
equipment
64
62
Comp-
ressor
Vapour
recovery
kit
66
34B
34A
38
36
34
60
58
118
18
20
14B
14D
16
14C
14A
14

Fig. 3

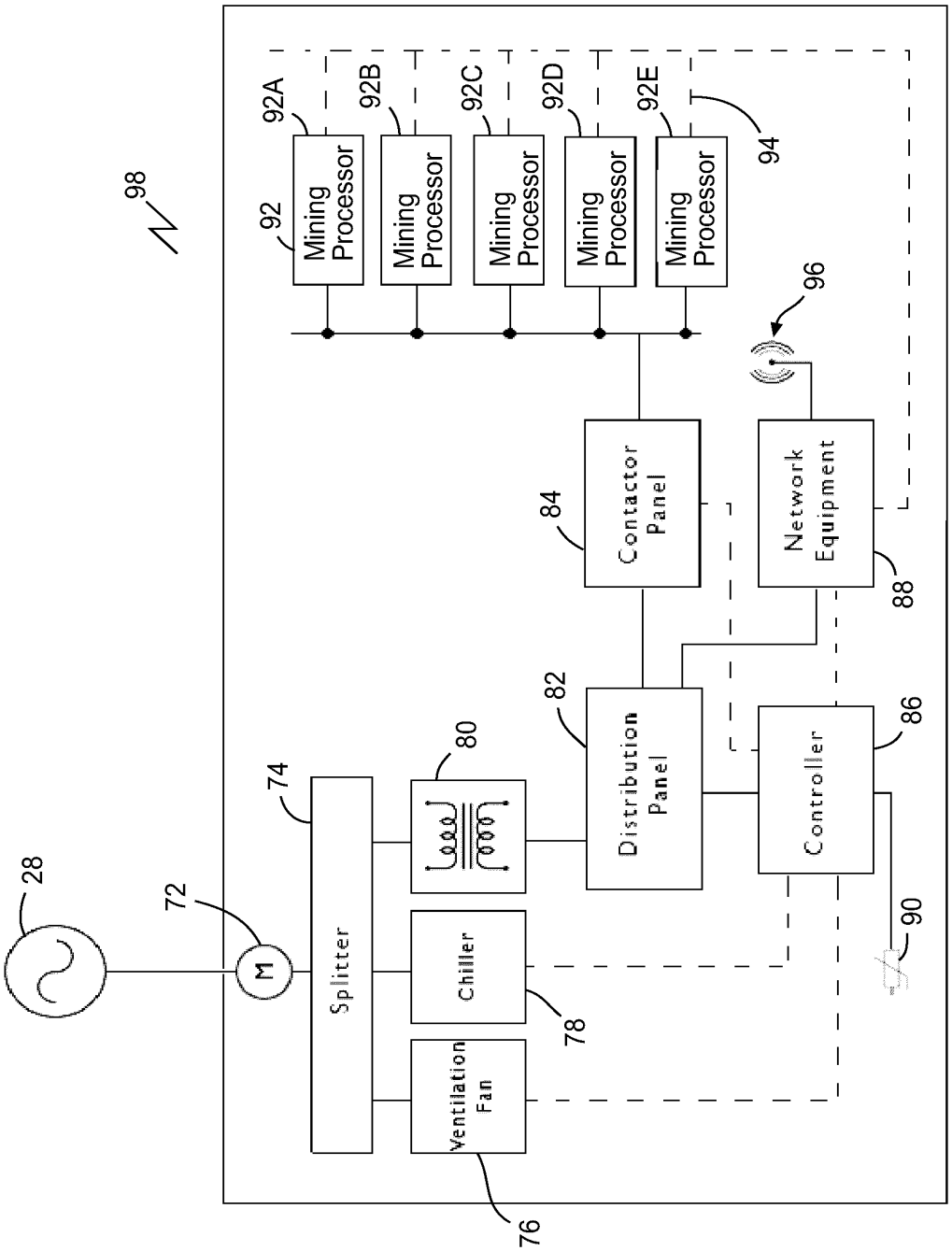
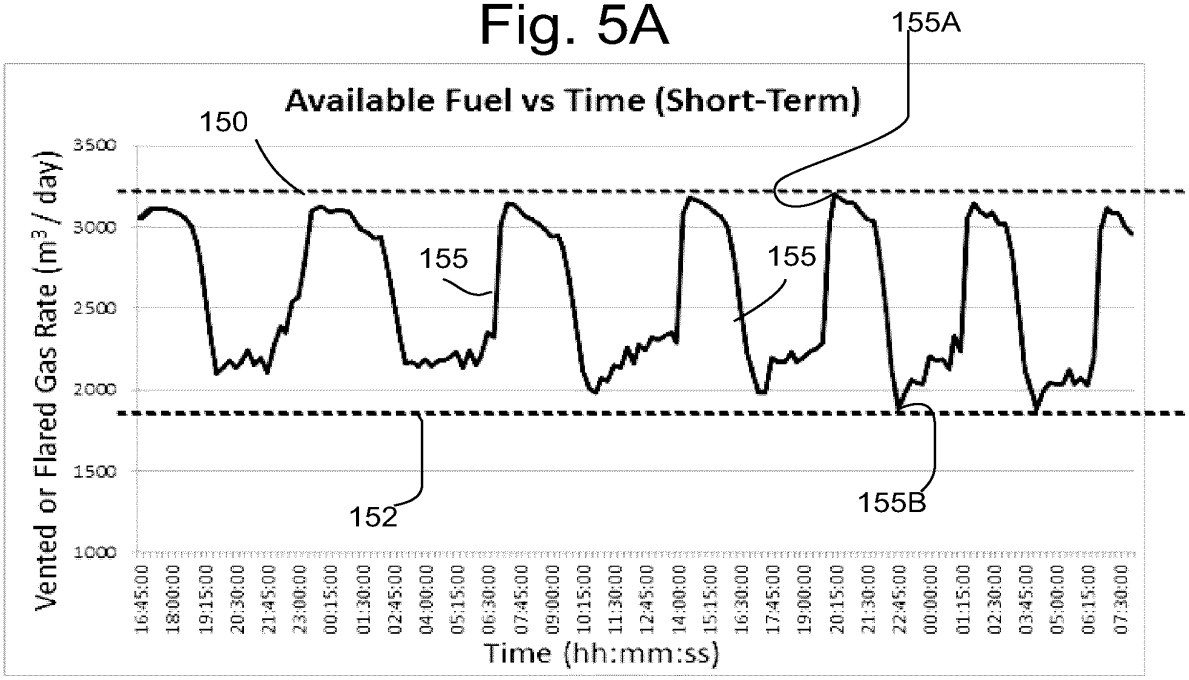

98
92
92A
92B
92C
92D
92E
94
Mining Processor
Mining Processor
Mining Processor
Mining Processor
Mining Processor
96
84
Contactor Panel
Network Equipment
88
82
Distribution Panel
Controller
86
80
74
Splitter
Chiller
Ventilation Fan
78
76
72
M1
28
90

Fig. 4

Fig. 5A


155A
Available Fuel vs Time (Short-Term)
150
Vented or Flared Gas Rate (m3 / day)
3500
3000
2500
2000
1500
1000
155
155
152
155B
16:45:00
18:00:00
19:15:00
20:30:00
21:45:00
23:00:00
00:15:00
01:30:00
02:45:00
04:00:00
05:15:00
06:30:00
07:45:00
09:00:00
10:15:00
11:30:00
12:45:00
14:00:00
15:15:00
16:30:00
17:45:00
19:00:00
20:15:00
21:30:00
22:45:00
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06:15:00
07:30:00
Time (hh:mm:ss)

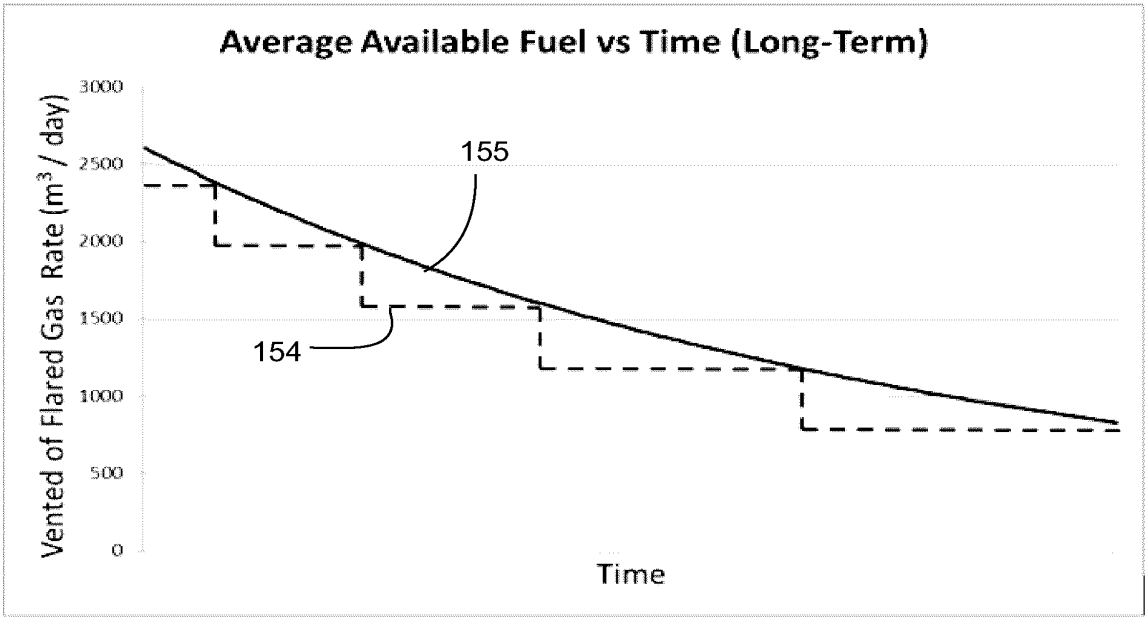

Average Available Fuel vs Time (Long-Term)
Vented of Flared Gas Rate (m3 / day)
3000
2500
2000
1500
1000
500
0
155
154
Time

Fig. 5B

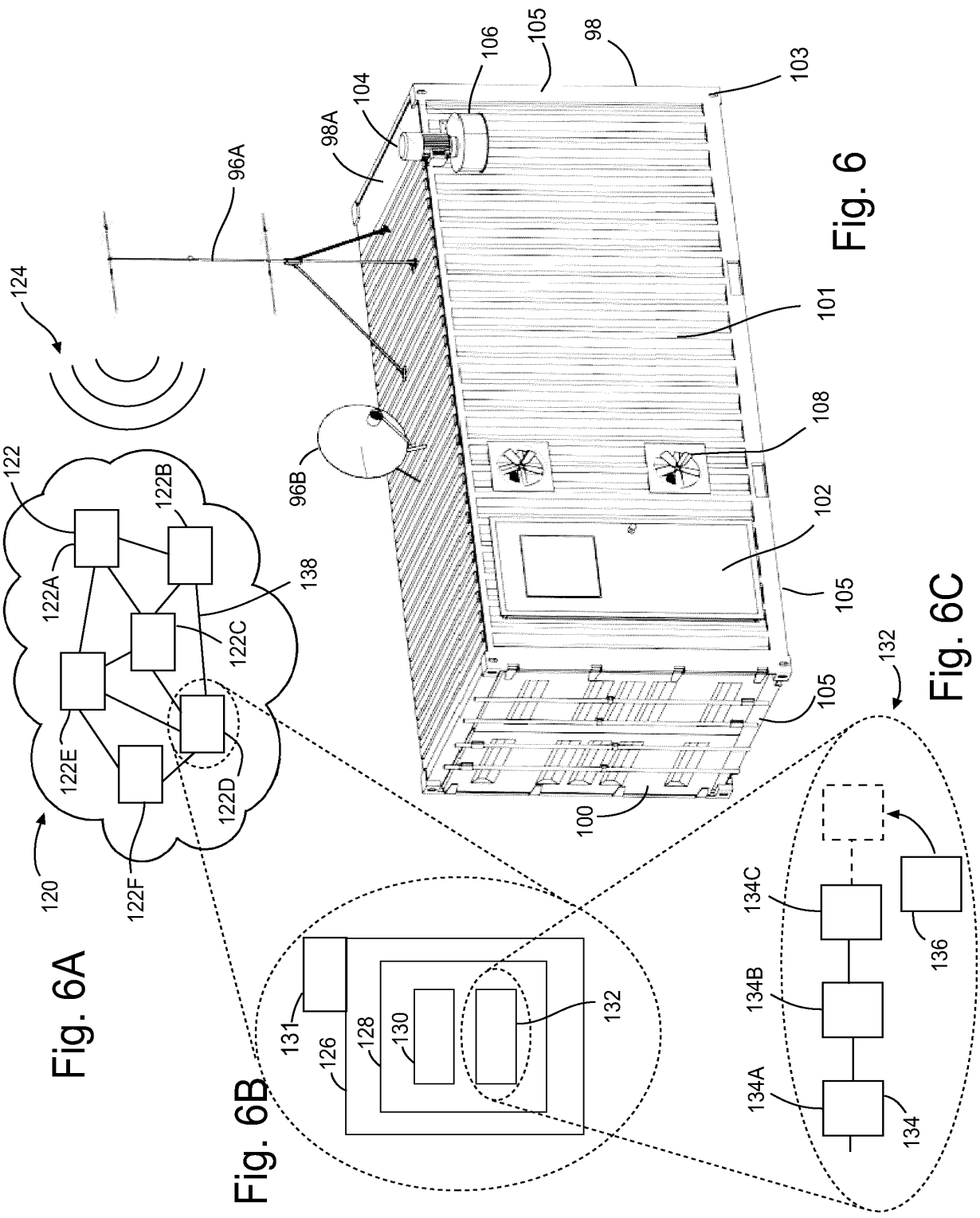


Fig. 6

Fig. 6A

Fig. 6B

Fig. 6C

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0	**For receiving Office use only**	
0-1	International Application No.	**PCT/CA2018/050135**
0-2	International Filing Date	**06 February 2018 (06.02.2018)**
0-3	Name of receiving Office and "PCT International Application"	**RO/CA**

0-4	**Form PCT/RO/101 PCT Request**	
0-4-1	Prepared Using	**ePCT-Filing Version 4.2.009 MT/FOP 20180125/1.1**
0-5	**Petition** The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	**Receiving Office (specified by the applicant)**	**Canadian Intellectual Property Office (RO/CA)**
0-7	**Applicant's or agent's file reference**	**91-3PCT**
I	**Title of Invention**	**BLOCKCHAIN MINE AT OIL OR GAS FACILITY**
II	**Applicant**	
II-1	This person is	**Applicant only**
II-2	Applicant for	**All designated States**
II-4	Name	**UPSTREAM DATA INC.**
II-5	Address	**3210 65 Avenue Lloydminster, Alberta T9V 3G9 Canada**
II-6	State of nationality	**CA**
II-7	State of residence	**CA**
II-10	e-mail	**robbie@nissenlaw.ca**
II-10(a)	E-mail authorization The receiving Office, the International Searching Authority, the International Bureau and the International Preliminary Examining Authority are authorized to use this e-mail address, if the Office or Authority so wishes, to send notifications issued in respect of this international application:	**exclusively in electronic form (no paper notifications will be sent)**

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III-1	**Applicant and/or inventor**	
III-1-1	This person is	**Inventor only**
III-1-3	Inventor for	**All designated States**
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IV-1	**Agent or common representative; or address for correspondence**	
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IV-1-4	Facsimile No.	**888-744-4480**
IV-1-5	e-mail	**robbie@nissenlaw.ca**
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IV-1-6	Agent's registration No.	**64256**
V	**DESIGNATIONS**	
V-1	**The filing of this request constitutes under Rule 4.9(a), the designation of all Contracting States bound by the PCT on the international filing date, for the grant of every kind of protection available and, where applicable, for the grant of both regional and national patents.**	
VI-1	**Priority claim of earlier national application**	
VI-1-1	Filing date	**08 February 2017 (08.02.2017)**
VI-1-2	Number	**62/456,380**
VI-1-3	Country or Member of WTO	**US**

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VI-2	**Incorporation by reference :** where an element of the international application referred to in Article 11(1)(iii)(d) or (e) or a part of the description, claims or drawings referred to in Rule 20.5(a) is not otherwise contained in this international application but is completely contained in an earlier application whose priority is claimed on the date on which one or more elements referred to in Article 11(1)(iii) were first received by the receiving Office, that element or part is, subject to confirmation under Rule 20.6, incorporated by reference in this international application for the purposes of Rule 20.6.		
VII-1	**International Searching Authority Chosen**	**Canadian Intellectual Property Office (ISA/CA)**	
VIII	**Declarations**	Number of declarations	
VIII-1	Declaration as to the identity of the inventor	-	
VIII-2	Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent	-	
VIII-3	Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application	-	
VIII-4	Declaration of inventorship (only for the purposes of the designation of the United States of America)	-	
VIII-5	Declaration as to non-prejudicial disclosures or exceptions to lack of novelty	-	
IX	**Check list**	Number of sheets	Electronic file(s) attached
IX-1	Request (including declaration sheets)	**4**	✓
IX-2	Description	**23**	✓
IX-3	Claims	**6**	✓
IX-4	Abstract	**1**	✓
IX-5	Drawings	**6**	✓
IX-7	TOTAL	**40**	
	Accompanying Items	Paper document(s) attached	Electronic file(s) attached
IX-8	Fee calculation sheet	-	✓
IX-20	**Figure of the drawings which should accompany the abstract**	**1**	
IX-21	**Language of filing of the international application**	**English**	
X-1	**Signature of applicant, agent or common representative**	**/RobertNissen/**	
X-1-1	Name (LAST, First)	**NISSEN, Robert**	
X-1-3	Capacity (if such capacity is not obvious from reading the request)	**Agent**	

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10-1	**Date of actual receipt of the purported international application**	**06 February 2018 (06.02.2018)**
10-2	**Drawings:**	
10-2-1	Received	
10-2-2	Not received	
10-3	**Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application**	
10-4	**Date of timely receipt of the required corrections under PCT Article 11(2)**	
10-5	**International Searching Authority**	**ISA/CA**
10-6	**Transmittal of search copy delayed until search fee is paid**	

FOR INTERNATIONAL BUREAU USE ONLY

11-1	**Date of receipt of the record copy by the International Bureau**	

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A system comprising:
a source of combustible gas produced from an oil production, storage, or processing facility;
a generator connected to the source of combustible gas; and
a blockchain mining device connected to the generator.

2. The system of claim 1 isolated from a sales gas line and an external electrical power grid.

3. The system of any one of claim 1 - 2 in which:
the oil production, storage, or processing facility comprises a remote oil well;
the source of combustible gas comprises the remote oil well; and
the remote oil well is connected to produce a continuous flow of combustible gas to power the generator.

4. The system of claim 3 further comprising a combustion engine connected to the source of combustible gas and connected to drive the generator.

5. The system of claim 4 in which the combustion engine is a prime mover that is connected to produce oil from the remote oil well.

6. The system of claim 4 in which the combustion engine is a first combustion engine, and further comprising a second combustion engine that is a prime mover that is connected to produce oil from the remote oil well.

7. The system of any one of claim 1 - 6 in which:
the oil production, storage, or processing facility comprise an oil storage or processing unit;
the source of combustible gas comprises the oil storage or processing unit, which has a gas outlet connected to supply combustible gas to operate the generator; and
the oil storage or processing unit is connected to receive oil produced from a remote oil well.

8. The system of any one of claim 1 - 7 in which the generator and blockchain mining device are located adjacent to the oil production, storage, or processing facility.

9. The system of any one of claim 1 - 8 in which the oil production, storage, or processing facility comprises a remote oil well, which comprises a plurality of remote oil wells, and one or both of the following conditions are satisfied:

the plurality of remote oil wells are located on a multi-well pad; or

the plurality of remote oil wells include a satellite well.

10. The system of any one of claim 1 - 9 in which:

the blockchain mining device has a network interface and a mining processor;

the network interface is connected to receive and transmit data through the internet to a network that stores or has access to a blockchain database; and

the mining processor is connected to the network interface and adapted to mine transactions associated with the blockchain database and to communicate with the blockchain database.

11. The system of claim 10 in which:

the network is a peer to peer network;

the blockchain database is a distributed database stored on plural nodes in the peer to peer network; and

the blockchain database stores transactional information for a digital currency.

12. The system of any one of claim 10 - 11 in which a controller is connected to modulate a power load level exerted by the blockchain mining device on the generator, by increasing or decreasing the mining activity of the mining processor.

13. The system of claim 12 in which:

the mining processor comprises a plurality of mining processors; and

the controller is connected to modulate the maximum power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining transactions.

14. The system of claim 13 in which:

the oil production, storage, or processing facility comprises a remote oil well;

the source of combustible gas comprises the remote oil well, which is connected to produce a continuous flow of combustible gas to operate the generator.

15. The system of claim 14 in which the controller is connected to modulate the power load level in response to variations in a production rate of combustible gas from the remote oil well.

16. The system of any one of claim 14 - 15 in which:

a production rate of combustible gas from the remote oil well varies between a daily minimum production rate and a daily maximum production rate; and

while the production rate is above the daily minimum production rate, the controller is set to limit the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate.

17. The system of claim 16 in which the controller is set to divert to a load bank excess electricity produced by the generator.

18. The system of any one of claim 14 - 15 in which:

a production rate of combustible gas from the remote oil well varies between a daily minimum production rate and a daily maximum production rate;

the controller is set to limit the power load level to above a power level producible by the generator when the production rate is at the daily minimum production rate; and

a backup source, of fuel or electricity, is connected make up a shortfall in fuel or electricity, respectively, required to supply the blockchain mining device with the power load level.

19. The system of any one of claim 1 - 18 in which a controller is connected to operate a cooling system to maintain the blockchain mining device within a predetermined operating range of temperature.

20. The system of any one of claim 1 - 19 in which the blockchain mining device is mounted on a skid or trailer.

21. The system of claim 20 in which the skid or trailer comprises a generator driven by an engine, which is connected to the source of combustible gas.

22. The system of any claim 21 in which the engine comprises a turbine.

23. The system of any one of claim 1 - 22 in which the blockchain mining device comprises an intermodal transport container.

24. A method comprising using a source of combustible gas produced at a hydrocarbon production well, storage, or processing facility, to produce electricity to operate a blockchain mining device located at the hydrocarbon production well, storage, or processing facility, respectively.

25. The method of claim 24 further comprising, prior to using the source of combustible gas:

disconnecting the source of combustible gas from a combustible gas disposal device at the hydrocarbon production well, storage, or processing facility; and

connecting the source of combustible gas to operate the blockchain mining device.

26. The method of any one of claim 24 - 25 further comprising:

connecting the source of combustible gas to operate the blockchain mining device; and

diverting gas from a combustible gas disposal or storage device to operate the blockchain mining device.

27. The method of any one of claim 25 – 26 in which the combustible gas disposal or storage device comprises one or more of a flare, a vent to the atmosphere, an incinerator, or a burner.

28. The method of any one of claim 24 - 27 in which the hydrocarbon production well, storage, or processing facility comprises an oil or gas well that is isolated from a sales gas line and an external electrical power grid.

29. The method of any one of claim 24 - 28 in which the source of combustible gas is a remote oil or gas well, and further comprising producing a continuous flow of combustible gas to power a generator connected to operate the blockchain mining device.

30. The method of claim 29 in which producing further comprises supplying combustible gas to a combustion engine that is connected to drive the generator.

31. The method of claim 30 in which the source of combustible gas is a remote oil well, and further comprising using the combustion engine as a prime mover to produce oil from the remote oil well.

32. The method of claim 31 in which, prior to using the source of combustible gas, the combustion engine is under loaded as the prime mover, and further comprising connecting the generator to a power takeoff connected to the combustion engine.

33. The method of claim 30 in which the combustion engine is a first combustion engine, and further comprising:

prior to supplying combustible gas to the first combustion engine, connecting the first combustion engine to receive combustible gas from the remote oil well; and

using a second combustion engine as a prime mover to produce oil from the remote oil well.

34. The method of any one of claim 29 - 33 further comprising operating the blockchain mining device to:

mine transactions with the blockchain mining device; and

communicate wirelessly through the internet to communicate with a blockchain database.

35. The method of claim 34 further comprising modulating, using a controller, a power load level exerted by the blockchain mining device on the generator, by increasing or decreasing a mining activity of the blockchain mining device.

36. The method of claim 35 in which:

the blockchain mining device comprises a plurality of mining processors; and

modulating comprises modulating the power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining transactions.

37. The method of claim 36 in which modulating comprises modulating the power load level in response to variations in a production rate of combustible gas from the remote oil or gas well.

38. The method of any one of claim 36 - 37 in which:

a production rate of combustible gas from the remote oil or gas well varies between a daily minimum production rate and a daily maximum production rate; and

modulating comprises limiting, while the production rate is above the daily minimum production rate, the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate.

39. The method of claim 38 further comprising diverting to a load bank excess electricity produced by the generator.

40. The method of any one of claim 36 - 37 in which:

a production rate of combustible gas from the remote oil or gas well varies between a daily minimum production rate and a daily maximum production rate;

modulating comprises limiting the power load level to above a power level produced by the generator when the production rate is at the daily minimum production rate; and

supplying from a backup fuel or electricity source a shortfall in fuel or electricity, respectively, required to supply the blockchain mining device with the power load level.

41. The method of claim 40 in which the power load level is limited to above a power level produced by the generator when the production rate is at the daily maximum production rate.

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APPLICATION NUMBER: ***62/456,380***
FILING DATE: ***February 08, 2017***

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Electronic Acknowledgement Receipt	
EFS ID:	28297344
Application Number:	62456380
International Application Number:	
Confirmation Number:	9001
Title of Invention:	BLOCKCHAIN MINE AT OIL OR GAS FACILITY
First Named Inventor/Applicant Name:	Stephen Barbour
Customer Number:	130443
Filer:	Robert Anton Nissen
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Attorney Docket Number:	91-3US
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Document Description: Provisional Cover Sheet (SB16)

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Provisional Application for Patent Cover Sheet

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

Inventor(s)

Inventor 1 — Remove

Given Name	Middle Name	Family Name	City	State	Country i
Stephen		Barbour	Lloydminster	AB	CA

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

Title of Invention	BLOCKCHAIN MINE AT OIL OR GAS FACILITY
Attorney Docket Number (if applicable)	91-3US

Correspondence Address

Direct all correspondence to (select one):

◉ The address corresponding to Customer Number	○ Firm or Individual Name
Customer Number	130443

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

- No.

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

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Document Description: Provisional Cover Sheet (SB16)

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

- ○ Applicant asserts small entity status under 37 CFR 1.27
- ◉ Applicant certifies micro entity status under 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
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Please see 37 CFR 1.4(d) for the form of the signature.

Signature	/RobertNissen#64256/			Date (YYYY-MM-DD)	2017-02-08
First Name	Robert	Last Name	Nissen	Registration Number (If appropriate)	64256

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BLOCKCHAIN MINE AT OIL OR GAS FACILITY

TECHNICAL FIELD

[0001] This document relates to blockchain mining at an oil or gas facility.

BACKGROUND

[0002] At remote oil and gas facilities, excess natural gas is often wasted, for example vented to atmosphere or burned via flaring.

SUMMARY

[0003] A system is disclosed comprising: a source of combustible gas produced from an oil production, storage, or processing facility, such as a remote oil well; a generator connected to the source of combustible gas; and a blockchain mining device connected to the generator.

[0004] A method is disclosed comprising using a source of combustible gas produced at a hydrocarbon production well, storage, or processing facility, to produce electricity to operate a blockchain mining device located at the hydrocarbon production well, storage, or processing facility, respectively.

[0005] A method is disclosed comprising using a source of combustible gas, which is produced from a remote oil or gas well, to produce electricity to operate a blockchain mining device.

[0006] A method is disclosed comprising: disconnecting a source of combustible gas from a gas vent or combustion device at a hydrocarbon production well or processing facility; and connecting the source of combustible gas to produce electricity to operate a blockchain mining device.

[0007] A method is disclosed comprising using a source of combustible gas, which is produced from a remote oil or gas well, to produce electricity to operate a blockchain mining device.

[0008] A method is disclosed of reducing vented or flared natural gas at upstream oil and gas facilities, the method consists of operating a natural gas aspirated prime mover

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fueled directly by the vented or flared gas source; the prime mover runs a generator to generate power, the generator powers a portable blockchain mine.

[0009] An upstream oil and gas blockchain mining apparatus is disclosed comprising a well, excess gas is captured off the casing of the well to run a natural gas engine, the engine runs both a hydraulic pump and a generator, the generator powers a portable blockchain mine, where the mining load is sized at the low end of the variable availability of gas; excess gas above the amount required to fuel the load is vented, where the mining load is sized at the low end of the variable availability of gas; the prime mover varies its torque based on the availability of the gas so as to minimize excess vented gas, excess power above the amount necessary to run the mining load is dissipated in a load bank, where the mining load is sized at the high end of the variable availability of gas; and make-up gas is taken from propane tanks on site or from line gas.

[0010] An upstream oil and gas blockchain mining apparatus is disclosed comprising a well, excess gas is captured off the casing of the well to run a prime mover such as an engine, turbine or boiler, the prime mover runs a generator, the generator powers a portable blockchain mine, where the mining load is sized at the low end of the variable availability of gas; excess gas above the amount required to fuel the load is vented, where the mining load is sized at the low end of the variable availability of gas; the prime mover varies its torque based on the availability of the gas so as to minimize excess vented gas, excess power above the amount necessary to run the mining load is dissipated in a load bank, where the mining load is sized at the high end of the variable availability of gas; make-up gas is taken from propane tanks on site or from line gas.

[0011] An upstream oil and gas blockchain mining apparatus is disclosed comprising a multi-well pad or group of satellite wells that produce into an oil treating facility, gas is captured off of the casing of the wells or off of oil and gas separating vessels such as tanks at the treating facility via vapor recovery units or compressors, the gas is used to run a prime mover such as an engine or turbine, the prime mover runs a generator which powers a portable blockchain mine.

[0012] An upstream oil and gas blockchain mining apparatus is disclosed comprising an oil and gas treating facility consists of a flare, incinerator, combustor or burner; excess

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gas is taken off the inlet line of the flare and redirected to a prime mover such as a natural gas engine, turbine or boiler, the prime mover runs a generator which powers a portable blockchain mining device.

[0013] A portable blockchain mining apparatus is disclosed comprising an enclosure containing the blockchain mining equipment, the enclosure having a ventilation mechanism, to dissipate the heat produced by the mining processors, for example one or more of an air supply fan, an exhaust fan, louvers, and others, the enclosure having a satellite, radio or cellular antenna to provide a connection to the internet, the enclosure containing network equipment such as a modem and network switch, the enclosure designed to be portable such as trailer mounted, the enclosure being insulated from the elements, the enclosure containing a natural gas aspirated engine and a generator to power the mining equipment, and the engine may comprise a turbine, where the enclosure is an intermodal shipping container, where the enclosure has a chiller or air cooling means fitted to it, the enclosure having a back-up heating means, such as a space heater, to be used to pre-heat the enclosure in case of shut down in cold weather.

[0014] In various embodiments, there may be included any one or more of the following features: The oil production, storage, or processing facility comprises a remote oil well. The oil production, storage, or processing facility comprise an oil storage or processing unit. The system is isolated from a sales gas line and an external electrical power grid. The source of combustible gas comprises the remote oil well; and the remote oil well is connected to produce a continuous flow of combustible gas to power the generator. A combustion engine is connected to the source of combustible gas and connected to drive the generator. The combustion engine is a prime mover that is connected to produce oil from the remote oil well. The combustion engine is a first combustion engine, and further comprising a second combustion engine that is a prime mover that is connected to produce oil from the remote oil well. The source of combustible gas comprises an oil storage or processing unit with a gas outlet connected to supply combustible gas to operate the generator; and the oil storage or processing unit is connected to receive oil produced from a remote oil well. The generator and blockchain mining device are located adjacent to the oil production, storage, or processing facility, for example adjacent to the remote oil well. The remote oil well

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comprises a plurality of remote oil wells, and one or both of the following conditions are satisfied: the plurality of remote oil wells are located on a multi-well pad; or the plurality of remote oil wells include a satellite well. The blockchain mining device has a network interface and a mining processor; the network interface is connected to receive and transmit data through the internet to a network that stores or has access to a blockchain database; and the mining processor is connected to the network interface and adapted to mine transactions into blocks associated with the blockchain database and to communicate with the blockchain database. The network is a peer to peer network; the blockchain database is a distributed database stored on plural nodes in the peer to peer network; and the blockchain database stores transactional information for a digital currency. A controller is connected to modulate a power load level exerted by the blockchain mining device on the generator, by increasing or decreasing the mining activity of the mining processor. The mining processor comprises a plurality of mining processors; and the controller is connected to modulate the maximum power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining. The source of combustible gas comprises the remote oil well, which is connected to produce a continuous flow of combustible gas to operate the generator. The controller is connected to modulate the power load level in response to variations in a production rate of combustible gas from the remote oil well. A production rate of combustible gas from the remote oil well varies between a daily minimum production rate and a daily maximum production rate; and while the production rate is above the daily minimum production rate, the controller is set to limit the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate. The controller is set to divert to a load bank excess electricity produced by the generator. A production rate of combustible gas from the remote oil well varies between a daily minimum production rate and a daily maximum production rate; the controller is set to limit the power load level to above a power level producible by the generator when the production rate is at the daily minimum production rate; and a backup source, of fuel or electricity, is connected make up a shortfall in fuel or electricity, respectively, required to supply the blockchain mining device with the power load level. A controller is connected to operate a ventilation, heating and cooling system to maintain the blockchain mining device

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within a predetermined operating range of temperature. The blockchain mining device is mounted on a skid or trailer. The skid or trailer comprises a generator driven by an engine, which is connected to the source of combustible gas. The engine comprises a turbine. The generator and engine may be mounted integral to the skid, trailer, or blockchain mining device. The blockchain mining device comprises an intermodal transport container. Prior to using the source of combustible gas: disconnecting the source of combustible gas from a combustible gas disposal device at the hydrocarbon production well, storage, or processing facility; and connecting the source of combustible gas to operate the blockchain mining device. Connecting the source of combustible gas to operate the blockchain mining device; and diverting gas from a combustible gas disposal or storage device to operate the blockchain mining device. The combustible gas disposal or storage device comprises one or more of a flare, a vent to the atmosphere, an incinerator, or a burner. The hydrocarbon production well, storage, or processing facility comprises an oil or gas well that is isolated from a sales gas line and an external electrical power grid. The source of combustible gas is a remote oil or gas well, and further comprising producing a continuous flow of combustible gas to power a generator connected to operate the blockchain mining device. Producing further comprises supplying combustible gas to a combustion engine that is connected to drive the generator. The source of combustible gas is a remote oil well, and further comprising using the combustion engine as a prime mover to produce oil from the remote oil well. Prior to using the source of combustible gas, the combustion engine is under loaded as the prime mover, and further comprising connecting the generator to a power takeoff connected to the combustion engine. The combustion engine is a first combustion engine, and further comprising: prior to supplying combustible gas to the first combustion engine, connecting the first combustion engine to receive combustible gas from the remote oil well; and using a second combustion engine as a prime mover to produce oil from the remote oil well. Operating the blockchain mining device to: mine transactions with the blockchain mining device, for example by mining the most recent block on the blockchain with the blockchain mining device,; and communicate wirelessly through the internet to communicate with a blockchain database. Modulating, using a controller, a power load level exerted by the blockchain mining device on the generator, by increasing or decreasing the mining

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activity of the blockchain mining device, for example the mining activity of plural mining processors contained within the blockchain mining device. The blockchain mining device comprises a plurality of mining processors; and modulating comprises modulating the power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining. Modulating comprises modulating the power load level in response to variations in a production rate of combustible gas from the remote oil or gas well. A production rate of combustible gas from the remote oil or gas well varies between a daily minimum production rate and a daily maximum production rate; and modulating comprises limiting, while the production rate is above the daily minimum production rate, the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate. One or more of: diverting to a load bank excess electricity produced by the generator; or diverting, to a combustible gas disposal or storage device, excess combustible gas supplied to operate the generator. A production rate of combustible gas from the remote oil or gas well varies between a daily minimum production rate and a daily maximum production rate; and modulating comprises limiting the power load level to above a power level produced by the generator when the production rate is at the daily minimum production rate; and supplying from a backup fuel or electricity source a shortfall in fuel or electricity, respectively, required to supply the blockchain mining device with the power load level. The power load level is limited to above a power level produced by the generator when the production rate is at the daily maximum production rate. The blockchain mining device may be replaced by a suitable mining device or data center. The prime mover is connected to drive a pump jack or a rotating drive head mounted to the remote oil well. The power unit comprises a generator driven by a power take off from the prime mover. A compressor is connected to pressurize natural gas supplied from the source of natural gas to the power unit. The source of combustible gas comprises raw natural gas. The remote oil well comprises a plurality of remote oil wells. The network interfaces comprises one or more of a satellite, cellular, or radio antenna, connected to a modem. Successfully mining a block by a mining processor provides a reward of the digital currency, and the reward is assigned to a digital wallet or address stored on a computer readable medium. Prior to using the source of combustible gas, disconnecting the source of

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combustible gas from a gas vent or combustion device; and connecting the source of combustible gas to operate the blockchain mining device. The source of vented or flared natural gas is derived from combustible vapors produced as a result of oil treating or processing, such as an oil storage tank, separating vessel, or a free water knockout. The source of vented or flared natural gas is sourced from the inlet line of a flare, incinerator, combustor or burner. Retrofitting an existing natural gas engine running a hydraulic pump to also run a generator, the generator powering a portable blockchain mine. Adding secondary prime movers such as natural gas internal combustion engines, turbines or boilers to run associated generators, the generators powering a portable blockchain mine. The mining load is sized at the low end of a variable vented or flared gas supply such that back-up fuel requirement usage is minimized, the excess gas over and about the amount required to fuel the mining load is vented or flared (combusted). The mining load is sized at the low end of a variable vented or flared gas supply such that back-up fuel requirement usage is minimized, the engine is controlled to throttle up or down based on the availability of excess gas so as to produce more torque, the additional torque generates excess power above that required to run the mining load, the excess power is directed to a load bank and dissipated as heat, and thus venting is minimized. The electrical load (of the mining hardware) is sized at the high end of a fluctuating excess or stranded gas supply such that venting or flaring is minimized or eliminated, where shortages in gas supply are made up from available back-up fuel such as propane or line gas. Changing the blockchain mine electrical load over time in response to changes in the excess or stranded gas volume availability. The mining load can be changed through the addition or removal of mining processors. Minimizing the vented or flared gas volumes by changing the mining hardware load in reaction to observed changes in average natural gas source rates over time. Minimizing the consumed back up fuel volumes by changing the mining hardware load in reaction to observed changes in average natural gas source rates over time.

[0015] These and other aspects of the device and method are set out in the claims, which are incorporated here by reference.

BRIEF DESCRIPTION OF THE FIGURES

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[0016] Embodiments will now be described with reference to the figures, in which like reference characters denote like elements, by way of example, and in which:

[0017] Fig. 1 is a schematic illustrating a system for powering a blockchain mine at a remote oil well using a generator retrofitted to a prime mover, which operates a drivehead to pump oil up from the reservoir.

[0018] Fig. 2 is a schematic illustrating another embodiment of a system for powering a blockchain mine at a remote oil well, with a prime mover (engine) operating the drivehead, and another engine and generator connected to the remote well for powering the blockchain mine independent of the prime mover that operates the drive head.

[0019] Fig. 3 is a schematic illustrating another embodiment of a system for powering a blockchain mine, in which a generator and engine are connected to be powered by combustible gas taken off of an oil storage unit to power the blockchain main.

[0020] Fig. 4 is a schematic depicting a blockchain mining device with a plurality of mining processors and associated control and network equipment housed within a portable enclosure.

[0021] Fig. 5A is a graph that illustrates short-term changes in available natural gas produced over time by an oil production, storage, or processing facility.

[0022] Fig. 5B is a graph that illustrates long-term changes in available natural gas produced over time by an oil production, storage, or processing facility.

[0023] Fig. 6 is a perspective view of an intermodal shipping container housing blockchain mining equipment for use at a remote oil or gas production, storage, or processing facility.

[0024] Figs. 6A, 6B, and 6C are diagrams that illustrate a) a peer-to-peer network, b) a layout of hardware forming a single node in the peer-to-peer network, and c) a conceptual illustration of a blockchain database stored on an individual node, respectively.

DETAILED DESCRIPTION

[0025] Immaterial modifications may be made to the embodiments described here without departing from what is covered by the claims.

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[0026] Natural gas is a naturally occurring combustible gas, often in the form of a mixture of hydrocarbon gases that is highly compressible and expansible. Methane (CH_4) is the chief constituent of most natural gas (constituting as much as 85% of some natural gases), with lesser amounts of ethane, propane, butane, and pentane. Impurities may also be present in large proportions, including carbon dioxide (CO_2), helium, nitrogen, and hydrogen sulfide (H_2S).

[0027] Natural gas may be produced from various sources. Natural gas may naturally separate from the oil stream as it is produced up the well and may be captured off the casing side of the well, the casing side referring to the annular space between the production tubing and the well bore or well casing if present. When natural gas is produced from an underground reservoir, it may be saturated with water vapor and may contain heavy hydrocarbon compounds as well as nonhydrocarbon impurities. Natural gas produced from shale reservoirs is known as shale gas. The composition of the gas stream is a function of the thermal maturity of the rock. Thermally immature rocks will contain heavier hydrocarbon components and may contain liquid components. Overmature reservoirs may contain appreciable quantities of CO_2. Natural gas may also be liberated out of solution from the oil as it is treated, such as in a tank on the well site or as it is undergoes further refinement at a downstream facility. In upstream production of oil and gas, natural gas may be produced as the primary product, for example from a gas well, or as a by-product of oil production, for example from an oil well.

[0028] Natural gas produced as a by-product of oil production may be used in various ways. The oil well operator may attempt to capture the gas and consume it, for example as on-site fuel for equipment or for instrumentation pressure. If there is an excess of natural gas that cannot be used on site, it may be desirable to sell the excess by tying the source into a pipeline network with a sales line to sell to a customer connected to the pipeline network. If the amount of gas is significant, it can be compressed or liquefied into storage vessels to be sold to market. If there is no pipeline network but there is a power grid, the operator may have the option to use the gas to generate electricity to sell to the power grid owner.

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[0029] Raw natural gas may require processing before it can be sold via a sales gas line. In long distance transmission of sales gas by pipeline, the pressure is usually less than 1,000 pounds per square inch gage (PSIG). It is important that no liquids form in the line because of condensation of either hydrocarbons or water. Hydrocarbon liquids reduce the pipeline efficiency and might hold up in the line to form liquid slugs, which might damage downstream compression equipment. Condensed water can do the same damage. Additionally, water may form solid complexes (hydrates), which accumulate and block the line. Further, it may be economical to extract liquefiable hydrocarbon components, which would have a higher market value on extraction as compared with their heating value if left in the gas.

[0030] The end user of natural gas needs to be assured of two conditions before committing to the use of gas in a home or factory: the gas must be of consistent quality, meeting sales gas specifications, and the supply of gas must be available at all times at the contracted rate. Gas treating facilities, therefore, must be designed to convert a particular raw gas mixture into a sales gas that meets the sales-gas specifications, and such facilities must operate without interruption. Typical processing steps include inlet separation, compression, gas sweetening, sulfur recovery or acid gas disposal, dehydration, hydrocarbon dewpoint control, fractionation and liquefied petroleum gas (LPG) recovery, and condensate stabilization. Sales gas specifications may vary by jurisdiction, although Table 1 below illustrates a typical specification. A sales gas line may be a pipeline of more than ten km of length, in some cases more than fifty, a hundred, or two hundred, kilometers in length, and connecting between an oil and gas site and travelling to an end user, a processing site, or a distribution site.

[0031] Table 1: Typical Sales Gas Specification

Component	Sales Gas Specification (maximum limits)
H2S (ppm)	10-16
O2 (mol. %)	0.0
CO2 (mol. %)	2-3

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Moisture (mg/L and lb/mmscf)	0.1-.16 (4-10)

[0032] A source of natural gas may be located at a remote oil and gas site, for example one that is lacking in accessible infrastructure such as an external pipeline network (sales line) or external power grid to sell into. In many locations it may not be economically feasible to build the infrastructure required to take the produced gas, or resultant electricity generated by combustion of the gas, to market, for example due to significant capital expense required or when the volume of gas is insufficient to pay out the investment. In such cases, the operator is forced to do something with the excess or stranded gas and is left with few options. Such options currently include venting the gas to atmosphere un-combusted, combusting the gas on site via flare, incinerator, or combustor, or worst case scenario ceasing production of the gas source, for example shutting in the oil well.

[0033] Venting excess gas to atmosphere is the most cost effective option for the operator but may have the most negative impact on the environment, as excess natural gas is regarded as 25-35 times worse than CO_2 as a greenhouse gas on a 100 year global warming potential timescale. Currently, venting gas to atmosphere is a common occurrence in oil production all over the world, as few jurisdictions restrict this practice.

[0034] Combustion disposal options, while more environmentally friendly than venting, represent a significant capital expense and do not provide utility for the operator. Combustion options include, but are not limited to, flaring and incineration. Combustion disposal methods produce waste heat and essentially represent waste of the potential energy of the gas. Such options may represent a capital liability to the operator, as such do not generate any revenue. Both combustion and venting can pose health concerns to nearby residents and are typically considered a nuisance.

[0035] Selling excess gas to a pipeline, i.e. a sales gas line, or using the gas to generate electricity to sell to an external power grid may be ideal options, but such options may require a significant capital expense when there is no infrastructure nearby. To pay off the capital expense, the volume of excess gas must be significant and the supply must also be guaranteed for the payout period. This is often not the case in many upstream oil production activities, as gas volumes associated with oil production can quickly diminish. Many remote

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oil and gas sites are located in unpopulated areas that are hundreds of kilometers outside of the nearest town, and of which no viable sales option is economically feasible.

[0036] An external power grid may be an electrical power transmission system comprising overhead or underground wiring, often supplying electricity in polyphase form, and spanning an electrical substation to an oil and gas site. Long-distance electricity transmission is typically carried with high voltage conductors. Transmission lines traverse large regions and require numerous support towers, often spanning hundreds of kilometers from generation to distribution and end use. Substations transform power from transmission voltages to distribution voltages, typically ranging from 2400 volts to 37,500 volts.

[0037] Referring to Figs. 1-3, a system 10 is illustrated comprising a source of combustible gas, for example natural gas or another hydrocarbon gas, produced from a hydrocarbon production, storage, or processing facility, in this case a remote oil well 14, a power unit such as a generator 28, and a blockchain mining device 12. The generator 28 is connected to produce electricity from the source of natural gas. The data mining or blockchain mining device 12 is connected to the generator 28, for example connected to receive electricity from or be powered by the generator 28. Referring to Fig. 2, an oil well 14 may include a suitable production tree 110, which may include a drivehead 16, a stuffing box 114, a flow tee 117, and a casinghead 15, all mounted on a wellhead 116.

[0038] Referring to Figs. 1-3, the remote oil or gas well 14 may be isolated from one or more of a sales gas line or external power grid. Isolated may refer to the fact the no sales gas line or external power grid, as the case may be, is located within a distance that would be economically feasible to connect into, for example such infrastructure may be more than five, ten, fifty, or a hundred kilometers away. Oil and gas production, storage, and processing assets are often distributed across remote locations. For example, well-sites can be remote and isolated from conventional communications equipment making the retrieval of well-site data difficult and unreliable. Some locations can be so remote, that periodic on-site visits are required to manually or semi-manually retrieve data. Some locations are only accessible via off-road vehicles or helicopter.

[0039] Referring to Figs. 1-2, the combustible gas used in the systems and methods in this document may be natural gas, such as raw natural gas and/or casing gas. Casing gas,

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also known as casinghead gas, is gas produced as a byproduct from a producing oil well 14. Referring to Fig. 1, casing gas is taken from the well 14 through the casinghead 15 at the top of the well 14. The casinghead 15 is in fluid communication with the annulus defined between the production tubing and the well bore or well casing lining the well bore. The casinghead may feed raw natural gas via supply line 41 to a gas tree 22, which may distribute the gas to the various pieces of equipment on site that may use or dispense of the gas. Raw gas may be a gas directly produced from the well, or otherwise unprocessed. Raw gas may contain natural gas liquids (condensate, natural gasoline, and liquefied petroleum gas), water, and some other impurities such as nitrogen, carbon dioxide, hydrogen sulfide and helium.

[0040] Referring to Figs. 1-3, the generator 28 and blockchain mining device 12 may be positioned at a suitable location relative to the hydrocarbon well, storage site, or processing facility, such as remote oil well 14. The generator 28 and blockchain mining device 12 may be located adjacent to the remote oil well 14, for example within one hundred meters. The generator 28 and blockchain mining device 12 may be located further distances away, for example within one kilometer of the remote oil well 14. Relatively longer distances may permit the device 12 to be powered by combustion of gas from plural wells 14 as described below.

[0041] Referring to Figs. 1-2, as above, system 10 may be located at a remote oil well. In the examples shown, the source of combustible gas comprises the remote oil well, 14. As the source of gas the remote oil well 14 may be connected to produce a continuous flow of combustible gas to power the generator 28, for example by supply of combustible gas to a combustion engine 24 that is connected to drive the generator 28.

[0042] Referring to Fig. 1, at a remote oil well site an internal combustion engine 24, such as a motor, may be set up to operate as, or to drive, a prime mover, such as a pump jack or rotating drivehead 16, which is connected to produce oil from the remote oil well 14. A prime mover in this document refers to any machine that converts energy from a source energy into mechanical energy, as a motive power source providing energy to move the components that pump oil from the well 14. A pumpjack converts the rotary motion of a driveshaft of the engine 24 to a vertical reciprocating motion of a walking beam to raise and

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lower the pump shaft (polished rod) to operate a downhole pump positioned at the base of production tubing in the well. A rotating drivehead 16 is a top side motor that rotates the polished rod to operate a downhole moineau or progressing cavity pump, which in turn drives oil up the production tubing to surface. Driveheads and pumpjacks are examples of artificial lift systems, other examples of which include bottom hole motors. A rotating drivehead may incorporate a hydraulic motor that is driven by a hydraulic pump 26, which is driven by the prime mover or engine 24, for example via supply and return hydraulic lines 18 and 20. At many remote oil wells 12 the prime mover or engine 24 is connected to receive as fuel natural gas from the source of combustible gas, in this case well 14, for example via gas tree 22 and supply line 54.

[0043] Referring to Fig. 1, the prime mover engine 24 may be connected to drive the generator 28. In one case the generator 28 is connected, in some cases retrofitted, to a power takeoff on the engine 24, such as a drive shaft. In some cases the drive shaft also operates the hydraulic pump 26, or drives the gearbox of a pumpjack. The remote oil well 14 may produce natural gas as a by-product off an annulus of the well 14 or other space between adjacent sections of piping, tubing, and / or casing positioned within the well 14. The generator 28 may be any device that converts mechanical energy to electrical energy, such mechanical energy being converted from energy of combustion of the combustible gas. The engine 24 may be a natural aspirated internal combustion engine. The combination of the generator 28 and the engine 24 may be referred to as a genset or engine-generator. The generator 28 may be an alternator, a gas turbine generator, a boiler coupled with a steam-powered generator, or other suitable devices.

[0044] Referring to Fig. 1, the generator 28 may be used to leverage excess energy available when the prime mover engine 24 is under loaded. For example, an engine 24 may be rated at 60 or higher horsepower, but may actually only require 20-30 horsepower to pump the well 14. In such a case the well 14 is a good candidate for retrofitting a generator 28 to leverage the excess power capacity of the engine 24. The generator 28 may thus be connected, for example through a power takeoff, to the combustion engine 24. In other cases the generator 28 may be connected to a mechanical energy source elsewhere in the existing power train, for example to the gearbox or crank assembly of a pump jack, or to a hydraulic

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motor connected to the pump 26. In other cases, the well site may have an existing generator 28 in place, for example already connected to be driven by the engine 24, and in such a case the mining device 12 may be connected to such generator 28 to receive power for operations.

[0045] Referring to Fig. 2, the mining device 12 may be powered by a generator 28 that is retrofitted, or already present, at a well site independent of the prime mover engine 24. One or more such components may be housed in an enclosure such as an engine building 50. In the example shown during operation the generator 28 is connected to be driven by an engine 56, referred to as a first engine, while a second engine 24 is present to act as the prime mover to pump the well 14. Prior to using the combustible gas to power the mining device 12, a user may connect the generator 28 to an existing engine 56, or may connect a gen-set comprising engine 56 and generator 28 to the gas supply, such as through lines 43 connected to a gas tree 22 on site. The engine 56 and generator 28, or just the generator 28, may be supplied as part of the mining device 12 in some cases, for example as a skid or trailer-mounted unit, in order to provide a turnkey or plug-and-play system that may be transported to the well 14, hooked up to the gas supply or tree 22, and operated.

[0046] Referring to Fig. 3, the mining device 12 may be powered by gas from a plurality of sources, such as a plurality of remote oil wells 14A-D. The plurality of remote oil wells 14A-D may be located on a multi-well pad 118, for example a plurality of horizontal wells that penetrate the same hydrocarbon reservoir. The plurality of remote oil wells 14A-D may include one or more satellite wells. A satellite well includes a well that is separate from a main group of wells or another well, but whose production is directed to a common processing facility. A satellite well may include a well that penetrates the same hydrocarbon reservoir as other wells in the plurality of wells. Each of the plurality of remote oil wells 14A-D may have respective casinghead gas lines 60 and oil or emulsion lines 58, which in the examples shown are bussed or grouped together, though such grouping is not necessary and in some cases independent lines may be used for each well or a group of one or more wells. The gas supply line or lines 60 may feed an engine 56 that drives a generator 28 that powers a mining device 12.

[0047] Referring to Fig. 3, the source of combustible gas may be an oil storage or processing unit, for example a production storage tank or tanks 34A-B. The tanks 34 may

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store emulsion, for example a mixture of oil and water, which may be supplied via one or more emulsion or oil lines 58 from wells 14A-D. The source of natural gas may comprise oil storage production tank 34 connected to receive oil produced from the remote oil well 14. Oil storage production tank 34 may store, and in some cases separate, emulsion 38, which may release vapor such as combustible gas 36 over time. A gas outlet, such as a vapor recovery unit 66, may be connected to supply natural gas from the oil storage production tank 34 to the engine 56. A compressor 62 or other suitable device may be used to pressurize the gas supplied to engine 56. The engine 56 and generator 28 may form a standalone unit or may be connected for other functions on the site, such as to pump a well or power communications or electrical equipment. Pressurized natural gas from compressor 62 may be used to fuel lease equipment 64, such as control equipment, communications equipment, surveillance equipment, heaters, or other components. Excess or unused gas may be directed to a gas disposal or storage device such as an atmospheric vent or combustion device, in this case a flare 68. Gas may be diverted from flare 68 to engine 56 via an excess gas line 70.

[0048] Referring to Fig. 3, in some cases a method of installing the system 10 on site includes reducing the amount of combustible gas that is wasted on site. For example, the method of install may include disconnecting the source of combustible gas, in this case from tanks 34 and/or line 60, from an atmospheric vent or combustion device, in this case flare 68, or to atmosphere via a vent 52 (Fig. 1). The source of combustible gas may be initially connected to operate the blockchain mining device 12. Once disconnected, the atmospheric vent or combustion device may be unused in the future, or may be used only in certain circumstances. In some cases combustible gas is diverted at least partially from the atmospheric vent or combustion device to operate the blockchain mining device 12, so that relatively less gas is wasted during operation. In such cases the flare 68 may remain connected to the source of gas, for example to receive a lesser feed of gas than prior to the installation of mining device 12, and in other cases to receive diverted excess gas in certain circumstances for example as described further elsewhere in this document. An atmospheric vent or combustion device is an example of a gas disposal device, and includes a flare, a vent to the atmosphere, an incinerator, a burner, and other suitable devices.

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[0049] A blockchain is a form of database, which may be saved as a distributed ledger in a network of nodes that maintains a continuously-growing list of records called blocks. Each block contains a timestamp and a link to a previous block. The data in a block cannot be altered retrospectively without significant computational effort and majority consensus of the network. The first blockchain was conceptualised by Satoshi Nakamoto in 2008 and implemented the following year as a core component of the digital currency, BITCOIN (TM), where it serves as the public ledger for all transactions. Through the use of a peer-to-peer network and a distributed timestamping server, a blockchain database is managed autonomously. The administration of BITCOIN (TM) currency is currently the primary use for blockchain technology, but there are other use cases for blockchain technology to maintain accurate, tamper-proof databases. Examples include maintaining records of land titles and historical events. While the potential in blockchain technology is vast, BITCOIN (TM) remains the most widely used today.

[0050] By design blockchains are inherently resistant to modification of the data — once recorded, the data in a block cannot be altered retroactively without network consensus. Blockchains are an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way. The ledger itself can also be programmed to trigger transactions automatically. Blockchains are secure by design and an example of a distributed computing system with high byzantine fault tolerance. Decentralised consensus can therefore be achieved with a blockchain. This makes blockchains suitable for the recording of events, medical records, and other records management activities, identity management, transaction processing and proving provenance. This offers the potential of mass disintermediation and vast repercussions for how global trade is conducted.

[0051] A blockchain facilitates secure online transactions. A blockchain is a decentralized digital ledger that records transactions on thousands of computers globally in such a way that the registered transactions cannot be altered retrospectively. This allows the participants to verify and audit transactions in an inexpensive manner. Transactions are authenticated by mass collaboration powered by collective self-interests. The result is a robust workflow where participants' uncertainty regarding data security is marginal. The use of a blockchain removes the characteristic of infinite reproducibility from a digital asset. It

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confirms that each unit of digital cash was spent only once, solving the long-standing problem of double spending. Blockchains have been described as a value-exchange protocol. This exchange of value can be completed more quickly, more safely and more cheaply with a blockchain. A blockchain can assign title rights because it provides a record that compels offer and acceptance. From the technical point of view a blockchain is a hashchain inside another hashchain.

[0052] A blockchain database may comprise two kinds of records: transactions and blocks. Blocks may hold batches of valid transactions that are hashed and encoded into a Merkle tree. Each block may include the hash of the prior block in the blockchain, linking the two. Variants of this format were used previously, for example in Git, and may not by itself be sufficient to qualify as a blockchain. The linked blocks form a chain. This iterative process confirms the integrity of the previous block, all the way back to the original genesis block. Some blockchains create a new block as frequently as every five seconds. As blockchains age they are said to grow in height. Blocks are structured by division into layers.

[0053] Sometimes separate blocks may be validated concurrently, creating a temporary fork. In addition to a secure hash based history, each blockchain has a specified algorithm for scoring different versions of the history so that one with a higher value can be selected over others. Blocks that are not selected for inclusion in the chain are called orphan blocks. Peers supporting the database don't have exactly the same version of the history at all times, rather they keep the highest scoring version of the database that they currently know of. Whenever a peer receives a higher scoring version (usually the old version with a single new block added) they extend or overwrite their own database and retransmit the improvement to their peers. There is never an absolute guarantee that any particular entry will remain in the best version of the history forever, but because blockchains are typically built to add the score of new blocks onto old blocks and there are incentives to only work on extending with new blocks rather than overwriting old blocks, the probability of an entry becoming superseded goes down exponentially as more blocks are built on top of it, eventually becoming very low. For example, in a blockchain using the proof-of-work system, the chain with the most cumulative proof-of-work is always considered the valid one by the network. In practice there are a number of methods that can demonstrate a sufficient

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level of computation. Within a blockchain the computation is carried out redundantly rather than in the traditional segregated and parallel manner.

[0054] Maintaining a blockchain database is referred to as mining, which refers to the distributed computational review process performed on each block of data in a block-chain. This allows for achievement of consensus in an environment where neither party knows or trusts each other. Those engaged in BITCOIN (TM) mining are rewarded for their effort with newly created BITCOIN (TM)s and transaction fees, which may be transferred to a digital wallet of a user upon completion of a designated task. BITCOIN (TM) miners may be located anywhere globally and may be operated by anyone. The mining hardware is tied to the blockchain network via an internet connection. Thus, little infrastructure is needed to operate and contribute to the system. All that is required to become a BITCOIN (TM) miner is the appropriate computer hardware, an internet connection and low cost electricity. The cheaper the electricity the more reward the miner will receive relative to competition, other miners.

[0055] Mining is the process of adding transaction records to BITCOIN (TM)'s public ledger of past transactions. This ledger of past transactions is called the blockchain as it is a chain of blocks. The blockchain serves to confirm transactions to the rest of the network as having taken place. BITCOIN (TM) nodes use the blockchain to distinguish legitimate BITCOIN (TM) transactions from attempts to re-spend coins that have already been spent elsewhere. Mining may be intentionally designed to be resource-intensive and difficult so that the number of blocks found each day by miners remains steady. Individual blocks may be required to contain a proof-of-work to be considered valid. This proof-of-work is verified by other BITCOIN (TM) nodes each time they receive a block. BITCOIN (TM) uses the hashcash proof-of-work function.

[0056] One purpose of mining is to allow BITCOIN (TM) nodes to reach a secure, tamper-resistant consensus. Mining may also be the mechanism used to introduce BITCOIN (TM)s into the system: Miners are paid any transaction fees as well as a subsidy of newly created coins. This both serves the purpose of disseminating new coins in a decentralized manner as well as motivating people to provide security for the system. BITCOIN (TM) mining is so called because it resembles the mining of other commodities: it requires

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exertion and it slowly makes new currency available at a rate that resembles the rate at which commodities like gold are mined from the ground.

[0057] Mining requires computational effort in the form of CPU cycles (CPU = central processing unit or central processor) to run a cryptographic hashing algorithm associated with the particular blockchain protocol. For a given mining processor, one can modify the computational effort through changing the core voltage or the clock rate of the processor. Doing so may result in more or less power consumed by the mining processor, and in some embodiments within this document such changes are described as changing the mining activity, or hashrate.

[0058] As the total network computational effort (or hashrate) increases on a blockchain over time, the probability for an individual miner to find a block and receive a reward diminishes. Today the BITCOIN (TM) network is so large that most individuals engaged in mining BITCOIN (TM) typically mine in pools using protocols such as the Stratum Mining Protocol. This allows individual miners to increase their reward frequency as a trade-off for splitting the block reward with the rest of the pool. Miners who are pool mining do not need the associated equipment needed to run a mining node as they only need compute and submit proof-of-work shares issued by the mining pool.

[0059] Since the energy cost of running blockchain mining equipment is its primary operating cost, a trend towards mining on low-cost hydroelectric power has become prevalent. This trend has promoted the centralization of blockchain miners in specific countries with abundant hydroelectric power, as miners who do not have access to cheap hydroelectricity cannot mine profitably because they are competing with the miners who do have access. BITCOIN (TM) mining centralization has been occurring in China where there is abundant low cost hydroelectric power. Centralization in blockchain mining is undesirable because the premise behind the blockchain innovation is not to have to trust a third party and to have inherent confidence and security through a decentralized, distributed network. There exists a need to further decentralize BITCOIN (TM) and other blockchain mining through a more decentralized source of low-cost power.

[0060] Referring to Fig. 6A, a blockchain network may be a peer to peer network 120 accessible via the internet. The blockchain database may be stored as a distributed

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database 132 on plural nodes 122, for example nodes 122A-F, in the peer to peer network 120. A protocol may be put in place to ensure that each copy of the database on each node is updated in a reliable fashion when one copy is updated on one node. Each copy of the blockchain database may store transactional information for a digital currency such as BITCOIN (TM). Nodes 122A-F may be electronic devices 126, for example desktop computers, laptop computers, tablet computers, cellular telephones, servers, or other suitable devices. Nodes 122A-F may communicate with one another over wired or wireless communication paths 138, for example through the internet. Each path 138 may be created through communication via switches, routers, modems, and other network equipment. Network 120 may include any number of nodes, for example tens, hundreds, thousands, millions, or more nodes. Nodes 122A-F may communicate to maintain a distributed global ledger of all official transactions. One or more of the nodes 122A-F may store a copy of the global ledger, for example a complete copy of the global ledger or a partial copy of the global ledger.

[0061] Referring to Fig. 6B, each node 122 may correspond to and be defined by a physical device 126, such as a computer. Device 126 may have one or more of storage and processing circuitry 128 and mining circuitry 130 if the node operates as a miner. Storage and processing circuitry 128 may have storage circuitry, for example hard disk drive storage, nonvolatile memory such as flash memory or other electrically-programmable-read-only memory configured to form a solid state drive, or volatile memory such as static or dynamic random-access-memory. Processing circuitry of storage and processing circuitry 128 may be used to control the operation of device 126. Storage circuitry 128 may store one or more copies of a portion or the entirety of the distributed database 132. Such processing circuitry may include suitable hardware components such as microprocessors, microcontrollers, and digital signal processors, or dedicated processing circuits such as application specific integrated circuits. Mining circuitry 130, for example an integrated circuit chip, may be used to perform data mining operations, for example verifying cryptocurrency transactions. Network communication hardware 131 may be used to communicate with other nodes and the network in general.

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[0062] Referring to Figs. 6A-B, every transaction added to the global ledger via nodes 122 may be verified by other the other nodes to help ensure validity of the ledger. Successfully mining a block may provide a reward of the digital currency, wherein, the processor circuitry 128 or another processor may assign the reward to a digital wallet or address stored on a computer readable medium.

[0063] Referring to Fig. 6C, storage and processing circuity 128, may maintain or store a blockchain database 132. The blockchain database 132 may store data as a series of interconnected blocks 134, for example blocks 134A-C. Each block 134 may have a respective header and contents and the header may contain the previous block's hash. Such information may be used in linking a new block, for example block 136, into the blockchain database 132. A new block 136 may be added to the chain as transactions are verified and confirmed into the blockchain. The integrity of the blockchain may be verified by known methods, and the linking of each block to previous blocks acts to create a liable and traceable path of title to anonymously but reliably verify a chain of title for a specific quantity of currency that has been the subject of one or more transactions.

[0064] Referring to Fig. 4, each blockchain mining device 12 may be composed of suitable components. The blockchain mining device 12 may have a network interface, such as network equipment 88, and one or a plurality of mining processors 92 (92A-92E for example). The network interface may be connected to receive and transmit data through the internet to a node on the network 120 (Fig. 6A), or to a mining pool (not shown), that stores or has access to a blockchain database, which may be for a digital currency. The mining processor or processors may be connected to the network interface and adapted to mine new transactions into the blockchain database and to communicate with the blockchain database. Referring to Fig. 4, the network interface or interfaces (network equipment 88) may have a configuration suitable for receiving and transmitting data through the internet to the network. Referring to Fig. 6, a network interface may comprise one or more communication device such as a network antenna 96A, a satellite antenna or dish 96B, a cellular antenna, or a radio antenna. The network equipment 88 may include or be connected to a modem.

[0065] Referring to Fig. 6, system 10 may be mounted within a portable enclosure 98 suitable for transporting blockchain mining device 12 between locations. The blockchain

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mining device 12 (Fig. 1) may be skid or trailer-mounted. The blockchain mining device 12 may be located in a portable enclosure 98, for example an intermodal transport container as shown. The portable enclosure 98 may have an access door 102 such as a man door, for example to permit entry and exit of a person such as equipment maintenance staff into and out of the enclosure 98. Portable enclosure 98 may have an end gate 100 to permit entry and exit of data mining equipment, for example mining processors 92, or power generating equipment such as engine 56 and generator 28, into and out of the enclosure 98. One or more network communications equipment 96, for example network antenna 96A such as a cellular network antenna or radio network antenna and / or satellite internet dish 96B may be mounted to the enclosure 98, for example to a top side 98A of the enclosure 98 or at another suitable location. Enclosure 98 may have an air supply, such as a centrifugal fan 106, for example driven by a motor 104, in order to cool and ventilate internal components to prevent system downtime or damage from overheating. Enclosure 98 may have one or more exhaust fans 108 and / or louvers, for example to facilitate air flow out of, or into, enclosure 98 for heat dissipation from enclosure 98. Enclosure 98 may have an air supply, such as an air supply fan 106, and may have an air supply filter (not shown) and conditioning equipment such as a dehumidifier (not shown) to provide a quality air supply for the enclosure 98.

[0066] Referring to Fig. 6, an intermodal container is a relatively large rectangular box-shaped standardized shipping container, designed and built for intermodal freight transport, meaning these containers can be used across different modes of transport – from ship to rail to truck – without unloading and reloading their cargo. Intermodal containers are primarily used to store and transport materials and products efficiently and securely in the global containerized intermodal freight transport system, but smaller numbers are in regional use as well. These containers are known under a number of names, such as simply container, cargo or freight container, ISO container, shipping, sea or ocean container, container van or (Conex) box, or seacan. Intermodal containers exist in many types and a number of standardized sizes, but ninety percent of the global container fleet are so-called dry freight or general purpose containers, which are durable closed steel boxes, mostly of either twenty or forty foot standard length. Common heights are 8 feet 6 inches and 9 feet 6 inches– the latter are known as High Cube or Hi-Cube containers. Intermodal containers often include

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corrugated walls 101 for strength. Each corner of the container may include a twistlock fitting 103 for securing the container to other containers and to various transportation devices such as a container trailer for a road-based tractor unit. Reinforcing beams 105 may span the edges of the container, for example the vertical columns that make up the four corners between sidewalls, and the horizontal beams that make up the longitudinal and lateral side edges of the base of the container.

[0067] Referring to Fig. 4, an example layout is illustrated of the components that may make up a mining device 12. The enclosure 98 may contain one or more of a meter 72, a splitter 74, a ventilation fan 76, a chiller 78, a step-down transformer 80, a distribution panel 82, a contactor panel 84, a controller 86, network equipment 88 such as a modem and a network switch, a thermistor or temperature sensor 90, and one or more mining processors 92 such as processors 92A-E. The generator 28 provides power to the mining device 12. In some cases, the power is metered via meter 72 so the user can know how much to pay the owner of the gas, and then the power may be split up.

[0068] Referring to Fig. 4, the generator 28 may produce polyphaser power, such as three phase power, which may be useful to run large loads such as the ventilation fan 76 and chiller 78. The power may travel into a step-down transformer 80. A transformer 80 may or may not be required depending on what voltage the generator makes. Transformer 80 may convert the input voltage to the required voltage to run the rest of the equipment. The transformer or transformers 80 may also convert the three phase power to single phase power. After the transformer the power may travel into a distribution panel 82. The panel 82 may feed power into the rest of the equipment. A contactor panel 84 may be used to switch on and off various mining processor circuits each connected to one or more mining processors 92. Different mining processor circuits may be designed for different voltages, as some mining processor power supplies run on 120V, and some run on 208V.

[0069] Referring to Fig. 4, the network equipment 88 block may provide a source of internet connection. A satellite / cellular / and/or radio antenna or other network communication equipment 96 may be fitted on the mining device 12 and connected to a modem. The modem may feed a network switch that has ethernet ports. Each mining processor controller may need one ethernet port. The network connection may also feed a

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controller or controllers 86, which may be a programmable logic controller (PLC), which may be accessed remotely. The controller 86 may be connected to at least a thermistor 90 (temperature sensor) within the mining device 12, to allow the controller 86 to control the ventilation and chilling loads within the enclosure 98. The controller 86 may control the contactor panel 84 switches to open and close circuits to add or remove mining processors 92 from operation. Each mining processor 92 may have a variety of configurations, but generally may include at least a power supply, a controller board and mining circuitry, such as an ASIC circuit. Various mining circuitry examples include CPU (central processing unit), GPU (graphics processing unit), FPGA (Field-Programmable Gate Array), and ASIC (application specific integrated circuit). The components of an ASIC mining processor include the hash boards (each board has numerous chips that is doing the hashing), a controller (to communicate with the network and optimize the mining processors chip frequency and fans for cooling), and a power supply (typically converts AC input power to DC power for the ASIC). Each mining processor 92 may be positioned on racks or shelving units.

[0070] Referring to Fig. 4, the blockchain mining device 12 may comprise a controller 86 connected to operate one or more aspects of the blockchain mining device 12. The controller 86 may be connected to operate a cooling system, for example having a ventilation fan 76 and a chiller 78, to maintain the mining processor 92 within a predetermined operating range of temperature. For example, if the internal temperature within the mining device 12 spikes above a predetermined maximum predetermined temperature, the air ventilation system may initiate or ramp up, and if the temperature contains past a second, relatively higher maximum predetermined temperature, the chilling unit may initiate or ramp up to achieve an air-conditioning effect. Similarly, if the temperature drops below a minimum predetermined temperature, a heating system (not shown) may initiate that may or may not leverage the air ventilation infrastructure to distribute heat. Plural controllers may be incorporated, for example to carry out different tasks, for example one controller for temperature control and another for mining processor control. The enclosure 98 may be structured to insulate its contents from the elements. The

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enclosure 98 may have a back-up heating device such as a space heater (not shown), for example to be used to heat the enclosure 98 in case of shut down in cold weather.

[0071] Referring to Fig. 4, one or more controllers 86 may modulate operating power loading to operate within the varying and gradually diminishing gas supply levels provided by a remote oil well or other hydrocarbon production, storage, or processing facility. The controller 86 may be connected to modulate a power load level used by the blockchain mining device 12, for example by increasing or decreasing the mining activity, or hashrate, of the mining processor 92. The mining processor 92 may comprise a plurality of processors, and the controller 86 may be connected to modulate the operating power loading level by increasing or decreasing the number of mining processors 92 that are actively engaged in mining, such as powering down one or more mining processors 92.

[0072] The controller 86 may be connected to modulate the power load level in response to variations in a supply or production rate of natural gas from the source of natural gas, for example a production rate of the well 14. Referring to Fig. 5A, over a relatively short time period, such as a single day, the controller 86 may modulate the power load by modulating the mining activity, or hashrate, of a mining processor 92 to correspond with either or both a) readings from a production rate sensor (not shown), or b) a measured gas production time profile based on recent (for example readings taken over the last week) historical gas production readings taken from the well, such as is shown in Fig. 5A. Thus, as gas production increases, so might the controller 86 increase mining activity, or hashrate, of mining processor 92, thereby drawing more power which results in a larger power load and gas consumption of the engine 56. As gas production decreases as it is known to do in a relatively predictable and cyclical fashion as shown, the mining activity may decrease. Adjustments may be made in real time to maximize the use of the casinghead gas produced and to minimize waste of either electricity generated or excess gas sent to a disposal device.

[0073] Referring to Fig. 5A, in some cases the power load level 152 may be set in relation to a daily minimum production rate 155B of natural gas. A production rate of combustible gas from the remote oil well 14 may vary between a daily minimum production rate 155B and a daily maximum production rate 155A. At least while the production rate is above the daily minimum production rate155B, or for a period of time of eight, twelve,

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twenty-four, or more hours, the controller 86 may be set to limit the power load level to at or below a power level 152 producible by the generator 28 when the production rate is at the daily minimum production rate. Thus, because the power load level is set to the minimum daily power supply from the generator 28, the controller 86 may retain a stable and consistent number of mining processors 92 in operation all day long. Venting may be decreased and little control philosophy may be required. Such a method may not completely eliminate waste such as venting however waste is reduced.

[0074] Referring to Fig. 1, while the power load level is set to the daily minimum, the excess gas or electricity may be addressed in a suitable fashion. In the example shown, excess electricity produced by the generator 28 is diverted to an electricity disposal device, in this case a load bank 32 when the production rate is above the daily minimum production rate 155B. In some cases the controller 86 or another suitable device, may divert excess gas from reaching engine 24, for example to a suitable gas disposal or storage device, such as an atmospheric vent, a flare, or other device. One or more valves, such as an instrumented valve, may be used for such diversion. In some cases excess gas sent to the engine will automatically divert to disposal through the gas tree, as such equipment may already have pressure regulation installed and set such that above a certain pressure excess gas is diverted to vent or flare. The load bank may be controlled to load up the engine so that all power generated in excess of the required amount to power the mine can be dissipated in the load bank as heat. In such a fashion the user can eliminate venting altogether as long as the engine is sized to consume the maximum available gas supply.

[0075] Referring to Fig. 5A, in some cases the power load level may be set in relation to a daily maximum production rate 155A of natural gas, with shortfall made up by a backup source of fuel or electricity. Referring to Fig. 1, the controller 86 may be set to limit the power load level 150 to above a power level producible by the generator 28 when the production rate 155 is at the daily minimum production rate 155B. In some cases the power level is set to be limited at least while the production rate 155 is above the daily minimum production rate 155B, or for another suitable time period such as eight, twelve, twenty-four or longer periods of time. The power load level may be set to at, below, or above the maximum power level producible by the generator 28 when the production rate 155 is at the

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daily maximum production rate 155A. A backup source, of fuel or electricity, in this case one or more of propane tanks 30A, 30B, underground fuel supply line 46, and gas outlet line 42 from production storage tank 34, may be connected make up shortfalls in fuel or electricity, respectively, required to supply the blockchain mining device 12 with the power load level. In such an example vented gas is eliminated but back-up fuel use may be increased, thus operating costs may rise relative to the daily low embodiment (embodiments where power load level is set in relation to the daily minimum production rate 155B in Fig. 5A) because of the requirement for the backup fuel or electricity source.

[0076] On a well site there may be one or more uses for produced gas, and thus the production rate of the well may be higher than the production rate of gas that arrives at the engine 24 or 56, however, due to the varying production rate, the fluctuation in the graph gives an indication of the proportional fluctuation in the actual production rate received by the engine 24 or 56 as the case may be. In some cases the engine 24 or 56 is undersized and cannot consume the maximum available gas, in which case the gas is sent to a gas disposal or storage device via pressure regulation in the gas tree and/or at the engine. The engine may comprise a throttle that permits some variation in gas consumption and power production at the engine level, and in some cases the controller 86 is set to operate the throttle. In some cases the power load level may be set in between the daily maximum and minimum production rates, with a backup energy or fuel source and a method of disposing or storing of excess gas.

[0077] Referring to Fig. 5B, the graph shows a typical scenario where gas production decreases over time. As the natural gas production rate 155 decreases, individual mining processors 92A-E may be removed or disengaged from the device 12 so that the load on the engine 24 or 56 is reduced correspondingly, thereby reducing the required natural gas consumption of the engine 24 or 56 to match or correspond with the decline in gas availability. Fig. 5B depicts an engine fuel consumption level 154 that is modulated over time in a stepped or stepdown fashion in relation to the gradually decreasing production rate 155 of the well.

[0078] In the claims, the word "comprising" is used in its inclusive sense and does not exclude other elements being present. The indefinite articles "a" and "an" before a claim

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feature do not exclude more than one of the feature being present. Each one of the individual features described here may be used in one or more embodiments and is not, by virtue only of being described here, to be construed as essential to all embodiments as defined by the claims.

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THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A system comprising:

a source of combustible gas produced from an oil production, storage, or processing facility;

a generator connected to the source of combustible gas; and

a blockchain mining device connected to the generator.

2. The system of claim 1 isolated from a sales gas line and an external electrical power grid.

3. The system of any one of claim 1 - 2 in which:

the oil production, storage, or processing facility comprises a remote oil well;

the source of combustible gas comprises the remote oil well; and

the remote oil well is connected to produce a continuous flow of combustible gas to power the generator.

4. The system of claim 3 further comprising a combustion engine connected to the source of combustible gas and connected to drive the generator.

5. The system of claim 4 in which the combustion engine is a prime mover that is connected to produce oil from the remote oil well.

6. The system of claim 4 in which the combustion engine is a first combustion engine, and further comprising a second combustion engine that is a prime mover that is connected to produce oil from the remote oil well.

7. The system of any one of claim 1 - 6 in which:

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the oil production, storage, or processing facility comprise an oil storage or processing unit;

the source of combustible gas comprises the oil storage or processing unit, which has a gas outlet connected to supply combustible gas to operate the generator; and

the oil storage or processing unit is connected to receive oil produced from a remote oil well.

8. The system of any one of claim 1 - 7 in which the generator and blockchain mining device are located adjacent to the oil production, storage, or processing facility.

9. The system of any one of claim 1 - 8 in which the oil production, storage, or processing facility comprises a remote oil well, which comprises a plurality of remote oil wells, and one or both of the following conditions are satisfied:

the plurality of remote oil wells are located on a multi-well pad; or

the plurality of remote oil wells include a satellite well.

10. The system of any one of claim 1 - 9 in which:

the blockchain mining device has a network interface and a mining processor;

the network interface is connected to receive and transmit data through the internet to a network that stores or has access to a blockchain database; and

the mining processor is connected to the network interface and adapted to mine transactions associated with the blockchain database and to communicate with the blockchain database.

11. The system of claim 10 in which:

the network is a peer to peer network;

the blockchain database is a distributed database stored on plural nodes in the peer to peer network; and

the blockchain database stores transactional information for a digital currency.

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12. The system of any one of claim 10 - 11 in which a controller is connected to modulate a power load level exerted by the blockchain mining device on the generator, by increasing or decreasing the mining activity of the mining processor.

13. The system of claim 12 in which:

the mining processor comprises a plurality of mining processors; and

the controller is connected to modulate the maximum power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining transactions.

14. The system of claim 13 in which:

the oil production, storage, or processing facility comprises a remote oil well;

the source of combustible gas comprises the remote oil well, which is connected to produce a continuous flow of combustible gas to operate the generator.

15. The system of claim 14 in which the controller is connected to modulate the power load level in response to variations in a production rate of combustible gas from the remote oil well.

16. The system of any one of claim 14 - 15 in which:

a production rate of combustible gas from the remote oil well varies between a daily minimum production rate and a daily maximum production rate; and

while the production rate is above the daily minimum production rate, the controller is set to limit the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate.

17. The system of claim 16 in which the controller is set to divert to a load bank excess electricity produced by the generator.

18. The system of any one of claim 14 - 15 in which:

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a production rate of combustible gas from the remote oil well varies between a daily minimum production rate and a daily maximum production rate;

the controller is set to limit the power load level to above a power level producible by the generator when the production rate is at the daily minimum production rate; and

a backup source, of fuel or electricity, is connected make up a shortfall in fuel or electricity, respectively, required to supply the blockchain mining device with the power load level.

19. The system of any one of claim 1 - 18 in which a controller is connected to operate a cooling system to maintain the blockchain mining device within a predetermined operating range of temperature.

20. The system of any one of claim 1 - 19 in which the blockchain mining device is mounted on a skid or trailer.

21. The system of claim 20 in which the skid or trailer comprises a generator driven by an engine, which is connected to the source of combustible gas.

22. The system of any claim 21 in which the engine comprises a turbine.

23. The system of any one of claim 1 - 22 in which the blockchain mining device comprises an intermodal transport container.

24. A method comprising using a source of combustible gas produced at a hydrocarbon production well, storage, or processing facility, to produce electricity to operate a blockchain mining device located at the hydrocarbon production well, storage, or processing facility, respectively.

25. The method of claim 24 further comprising, prior to using the source of combustible gas:

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disconnecting the source of combustible gas from a combustible gas disposal device at the hydrocarbon production well, storage, or processing facility; and

connecting the source of combustible gas to operate the blockchain mining device.

26. The method of any one of claim 24 - 25 further comprising:

connecting the source of combustible gas to operate the blockchain mining device; and

diverting gas from a combustible gas disposal or storage device to operate the blockchain mining device.

27. The method of any one of claim 25 – 26 in which the combustible gas disposal or storage device comprises one or more of a flare, a vent to the atmosphere, an incinerator, or a burner.

28. The method of any one of claim 24 - 27 in which the hydrocarbon production well, storage, or processing facility comprises an oil or gas well that is isolated from a sales gas line and an external electrical power grid.

29. The method of any one of claim 24 - 28 in which the source of combustible gas is a remote oil or gas well, and further comprising producing a continuous flow of combustible gas to power a generator connected to operate the blockchain mining device.

30. The method of claim 29 in which producing further comprises supplying combustible gas to a combustion engine that is connected to drive the generator.

31. The method of claim 30 in which the source of combustible gas is a remote oil well, and further comprising using the combustion engine as a prime mover to produce oil from the remote oil well.

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32. The method of claim 31 in which, prior to using the source of combustible gas, the combustion engine is under loaded as the prime mover, and further comprising connecting the generator to a power takeoff connected to the combustion engine.

33. The method of claim 30 in which the combustion engine is a first combustion engine, and further comprising:

prior to supplying combustible gas to the first combustion engine, connecting the first combustion engine to receive combustible gas from the remote oil well; and

using a second combustion engine as a prime mover to produce oil from the remote oil well.

34. The method of any one of claim 29 - 33 further comprising operating the blockchain mining device to:

mine transactions with the blockchain mining device; and

communicate wirelessly through the internet to communicate with a blockchain database.

35. The method of claim 34 further comprising modulating, using a controller, a power load level exerted by the blockchain mining device on the generator, by increasing or decreasing a mining activity of the blockchain mining device.

36. The method of claim 35 in which:

the blockchain mining device comprises a plurality of mining processors; and

modulating comprises modulating the power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining transactions.

37. The method of claim 36 in which modulating comprises modulating the power load level in response to variations in a production rate of combustible gas from the remote oil or gas well.

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38. The method of any one of claim 36 - 37 in which:

a production rate of combustible gas from the remote oil or gas well varies between a daily minimum production rate and a daily maximum production rate; and

modulating comprises limiting, while the production rate is above the daily minimum production rate, the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate.

39. The method of claim 38 further comprising diverting to a load bank excess electricity produced by the generator.

40. The method of any one of claim 36 - 37 in which:

a production rate of combustible gas from the remote oil or gas well varies between a daily minimum production rate and a daily maximum production rate;

modulating comprises limiting the power load level to above a power level produced by the generator when the production rate is at the daily minimum production rate; and

supplying from a backup fuel or electricity source a shortfall in fuel or electricity, respectively, required to supply the blockchain mining device with the power load level.

41. The method of claim 40 in which the power load level is limited to above a power level produced by the generator when the production rate is at the daily maximum production rate.

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ABSTRACT OF THE DISCLOSURE

Methods and systems of operating a blockchain mining device using natural gas produced at a hydrocarbon production, storage, or processing site/facility. A generator may be retrofitted to an existing prime mover used to pump the well, and the generator may be used to power the blockchain mining device. Portable mining devices may be hooked up to a casinghead gas supply at a remote, isolated oil facility. Power loading levels may be modulated by adjusting mining transaction levels to correspond with combustible gas production levels.

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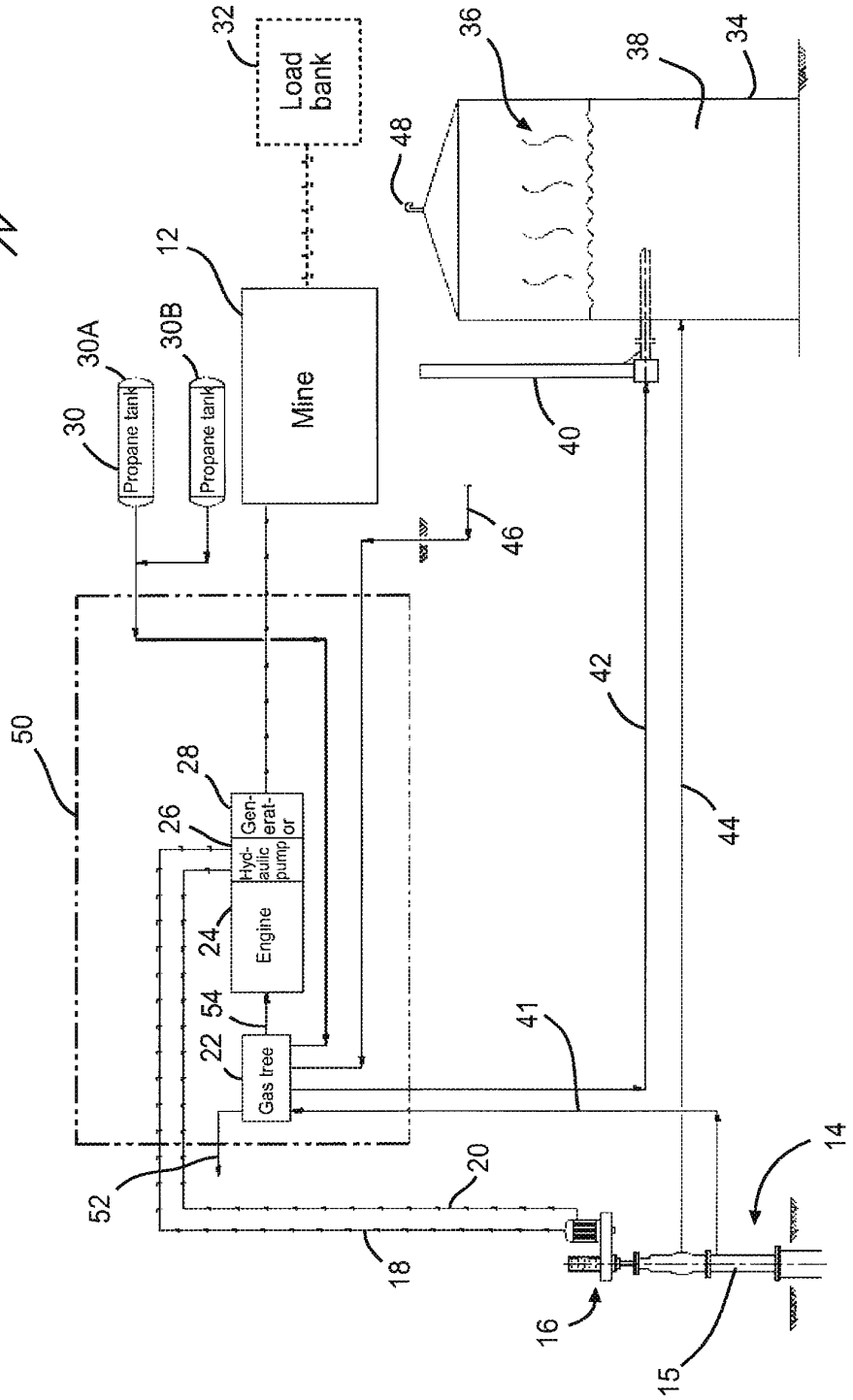


Fig. 1

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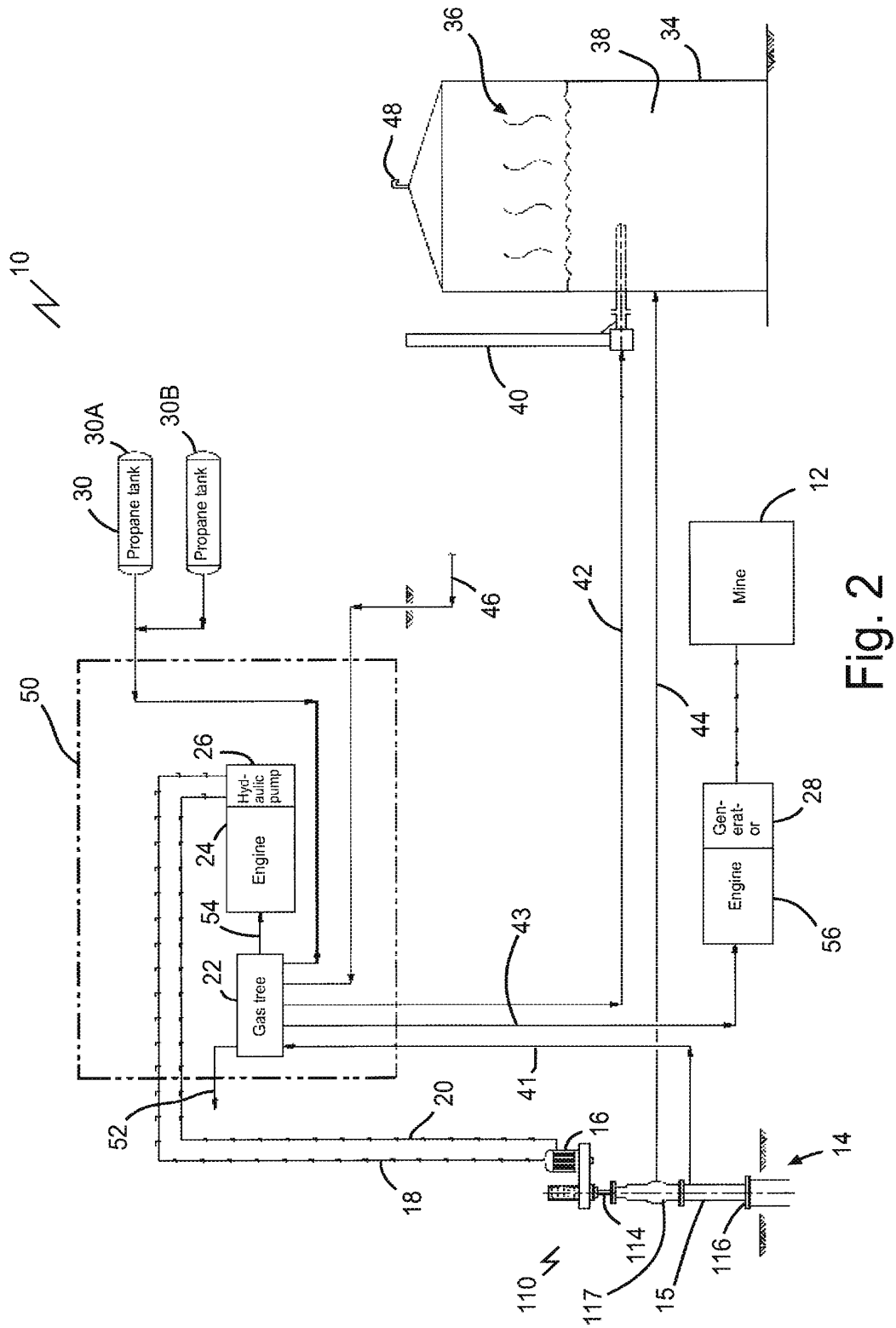


Fig. 2

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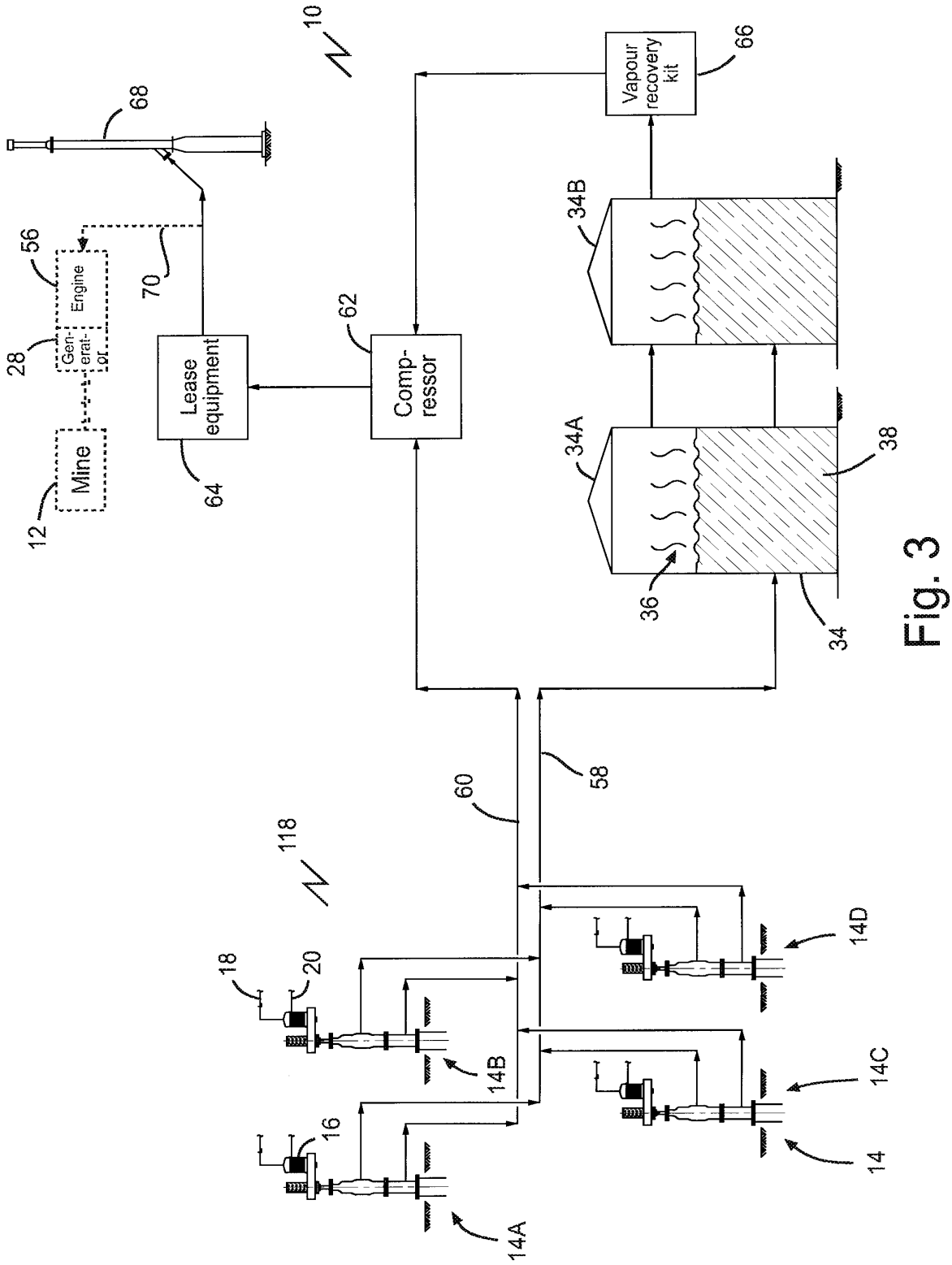


Fig. 3

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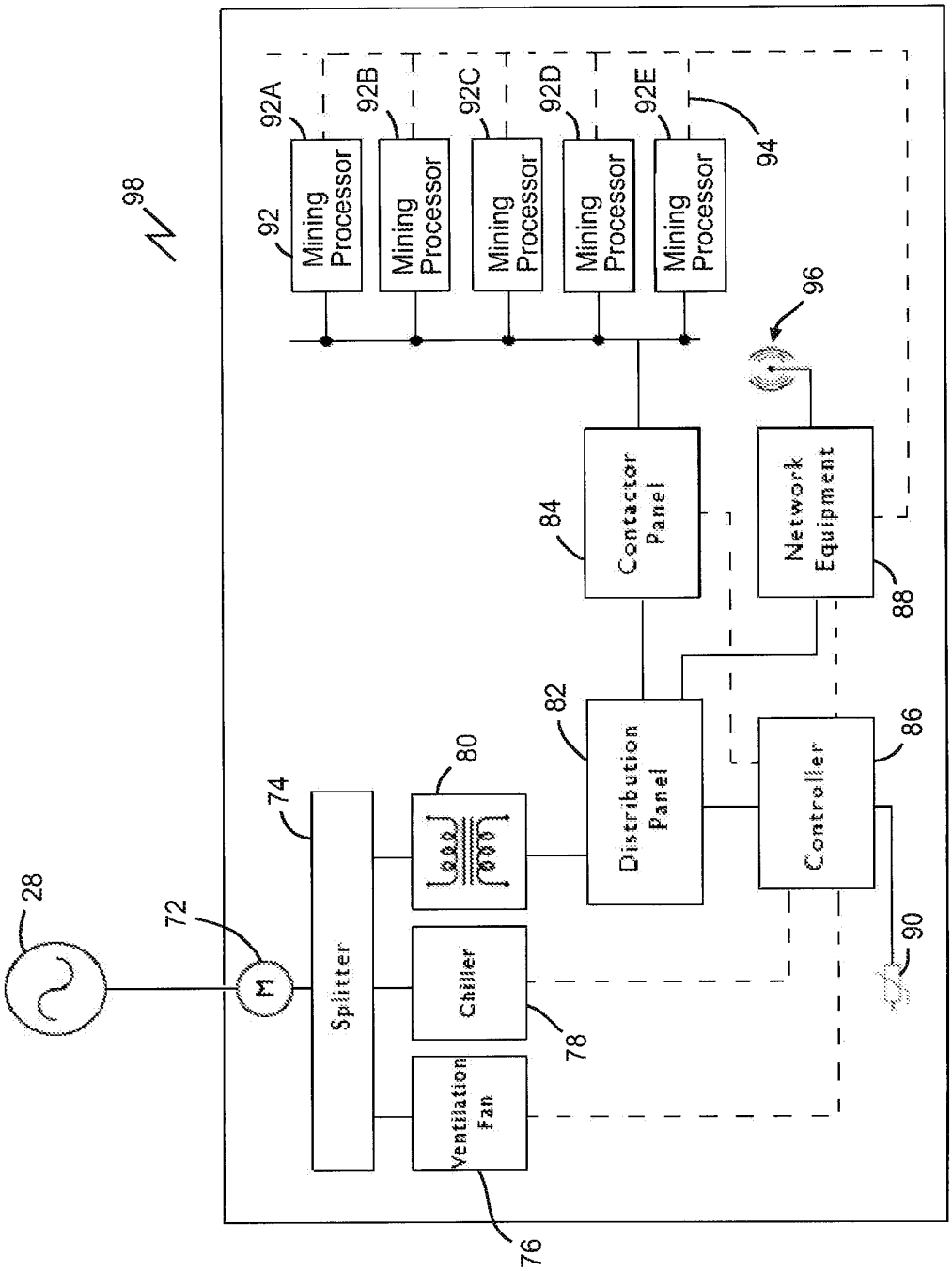
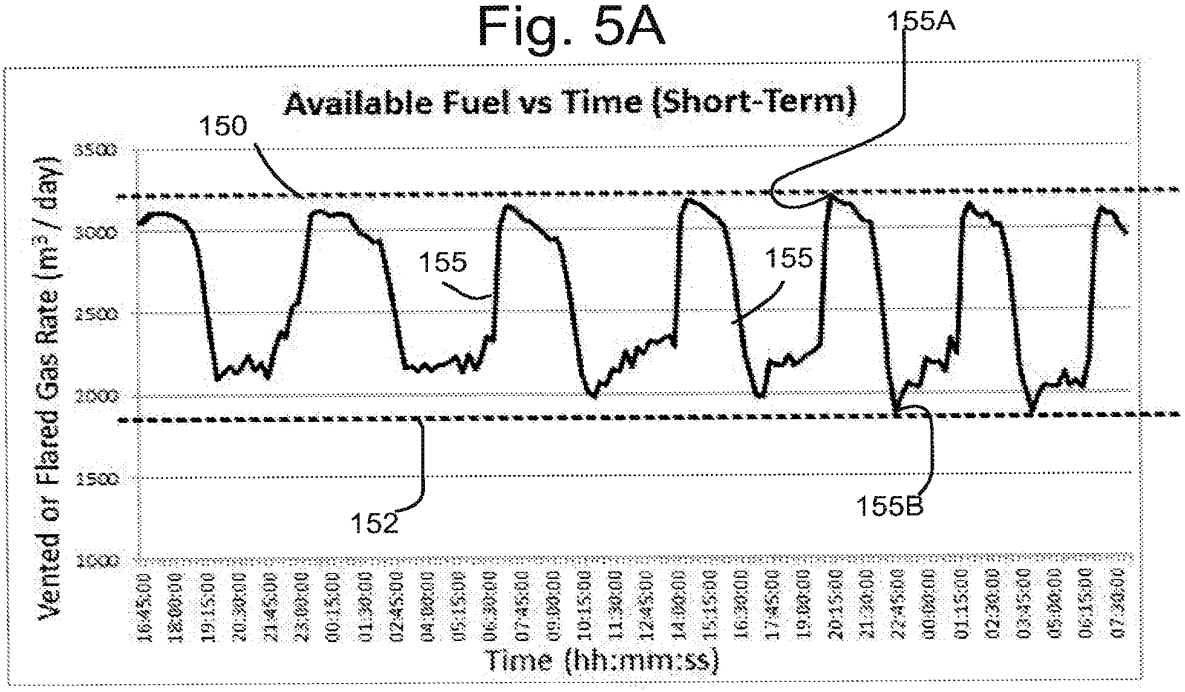


Fig. 4

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Fig. 5A



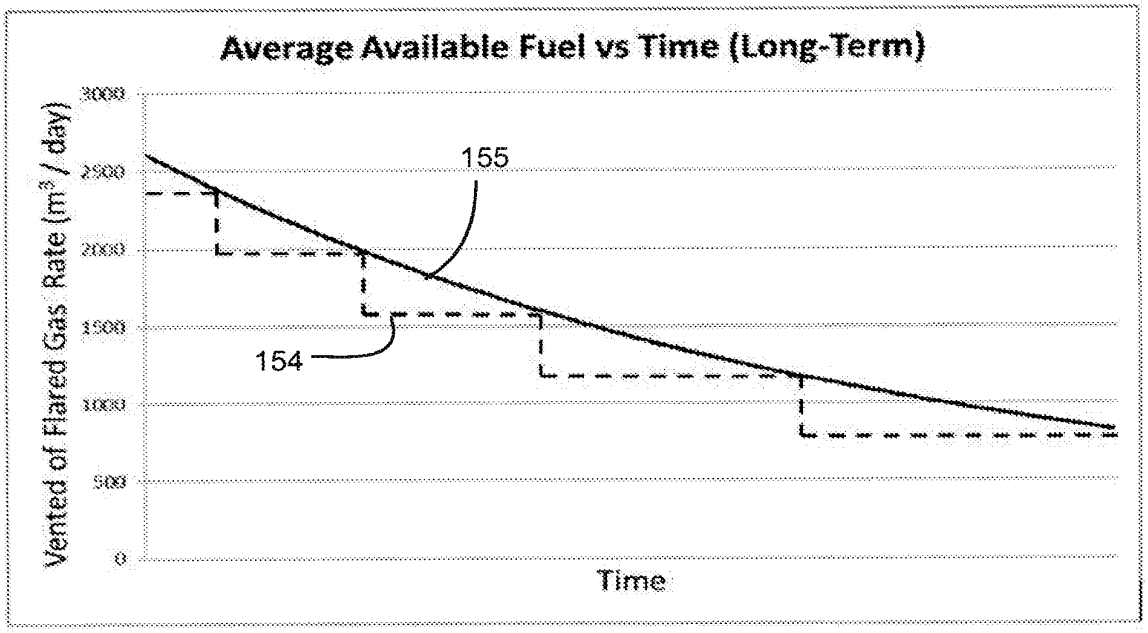


Fig. 5B

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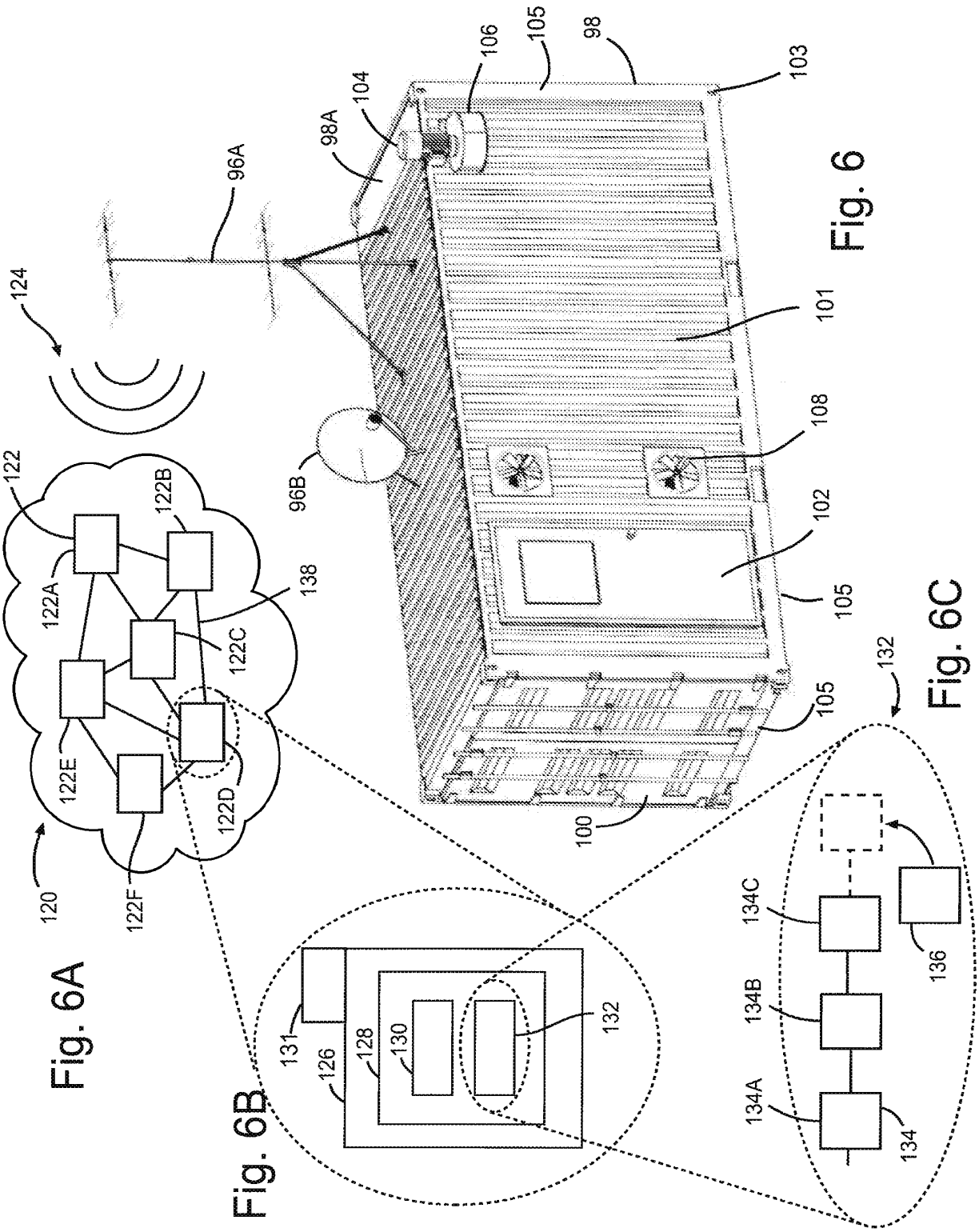


Fig. 6

Fig. 6A

Fig. 6B

Fig. 6C

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ORGANIZATION

DOCUMENT MADE AVAILABLE UNDER THE PATENT COOPERATION TREATY (PCT)

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	91A-3US
	Application Number	
Title of Invention	BLOCKCHAIN MINE AT OIL OR GAS FACILITY	

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

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Stephen		Barbour	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

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Postal Code	T9V3G9	Country i	CA

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

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	130443		
Email Address	robbie@nissenlaw.ca	Add Email	Remove Email

Application Information:

Title of the Invention	BLOCKCHAIN MINE AT OIL OR GAS FACILITY		
Attorney Docket Number	91A-3US	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	6	Suggested Figure for Publication (if any)	6

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Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	130443		

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix	Remove
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Prefix	**Given Name**	Middle Name	**Family Name**	Suffix	Remove
Registration Number					

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Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	a 371 of international	PCT/CA2018/050135	2018-02-06

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
PCT/CA2018/050135	Claims benefit of provisional	62456380	2017-02-08

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Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

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

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

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

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	91A-3US
	Application Number	
Title of Invention	BLOCKCHAIN MINE AT OIL OR GAS FACILITY	

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.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	91A-3US
	Application Number	
Title of Invention	BLOCKCHAIN MINE AT OIL OR GAS FACILITY	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:	

If the Applicant is an Organization check here. ☒

Organization Name	Upstream Data Inc.		
Mailing Address Information For Applicant:			
Address 1	3210-65 Ave		
Address 2			
City	Lloydminster	**State/Province**	OT
Country[i]	CA	Postal Code	T9V 3G9
Phone Number		Fax Number	
Email Address			

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Assignee Information including Non-Applicant Assignee Information:

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Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	91A-3US
	Application Number	
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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 INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e. g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/robbienissen#64256/			Date (YYYY-MM-DD)	
First Name	Robert	Last Name	Nissen	Registration Number	64256

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

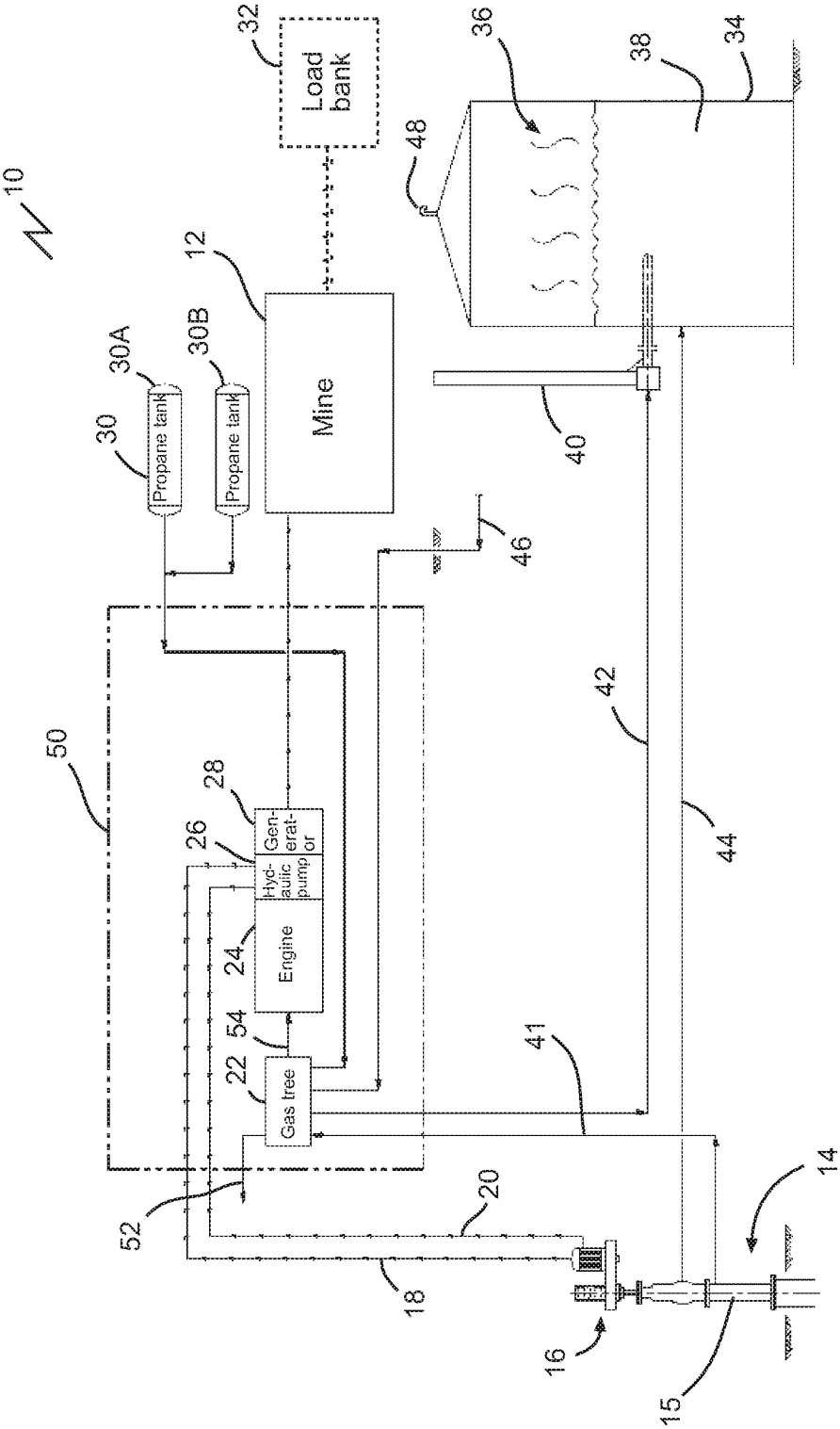

10
12
Mine
32
Load bank
30
30A
Propane tank
30B
Propane tank
34
36
38
40
42
44
46
48
50
52
54
14
15
16
18
20
22
Gas tree
24
Engine
26
Hyd-aulic pump
28
Gen-erat-or
41

Fig. 1

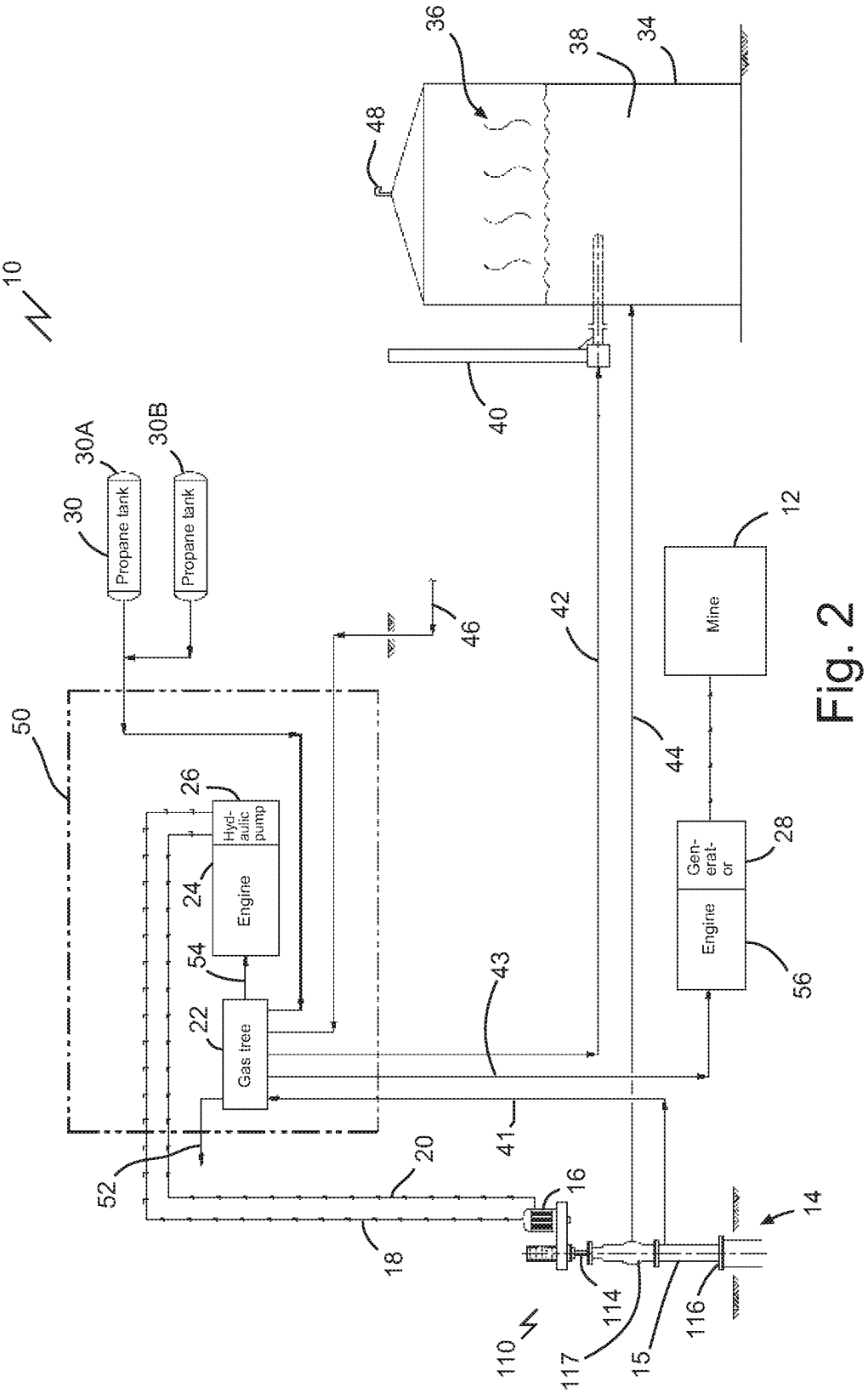

10
30
30A
30B
Propane tank
Propane tank
36
38
34
48
40
46
42
12
Mine
50
26
Hyd-aulic pump
24
Engine
54
22
Gas free
43
28
Gen-erat-or
Engine
56
44
52
20
41
16
14
18
110
114
117
15
116

Fig. 2

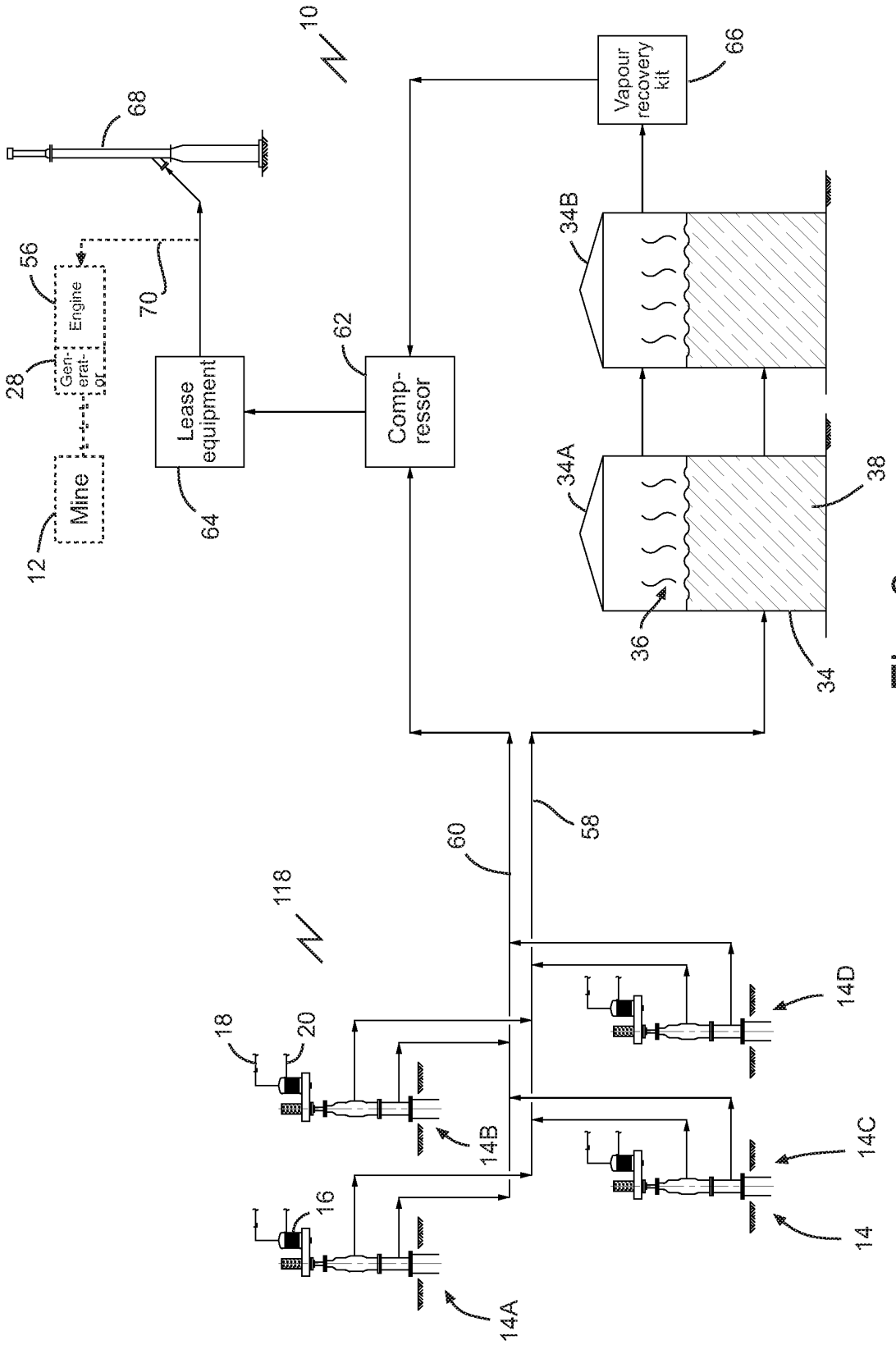

10
68
56
Engine
Gen-
erat-
or
28
70
62
Comp-
ressor
Lease
equipment
64
Mine
12
Vapour
recovery
kit
66
34B
34A
38
36
34
60
58
118
18
20
14B
16
14A
14D
14C
14

Fig. 3

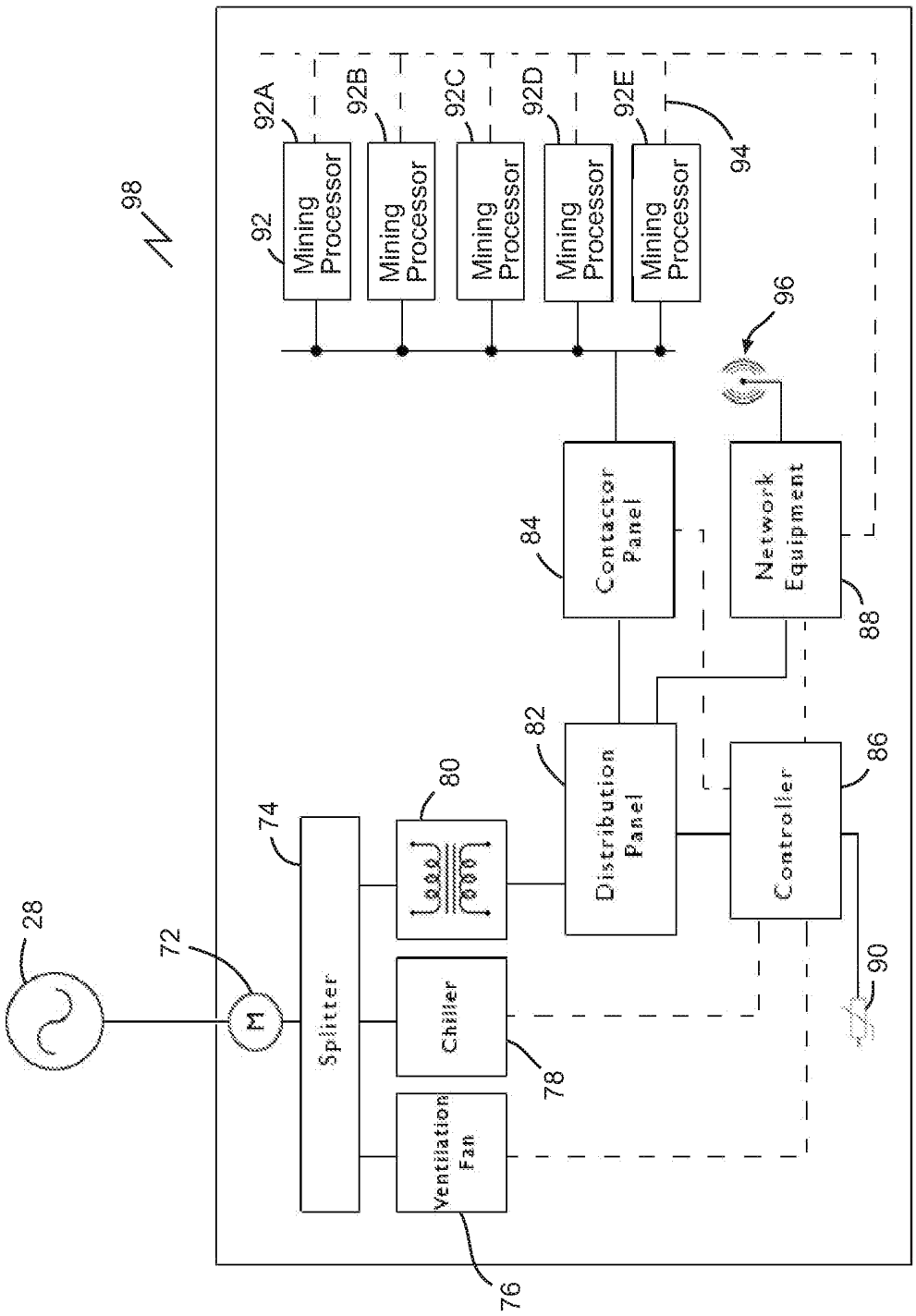
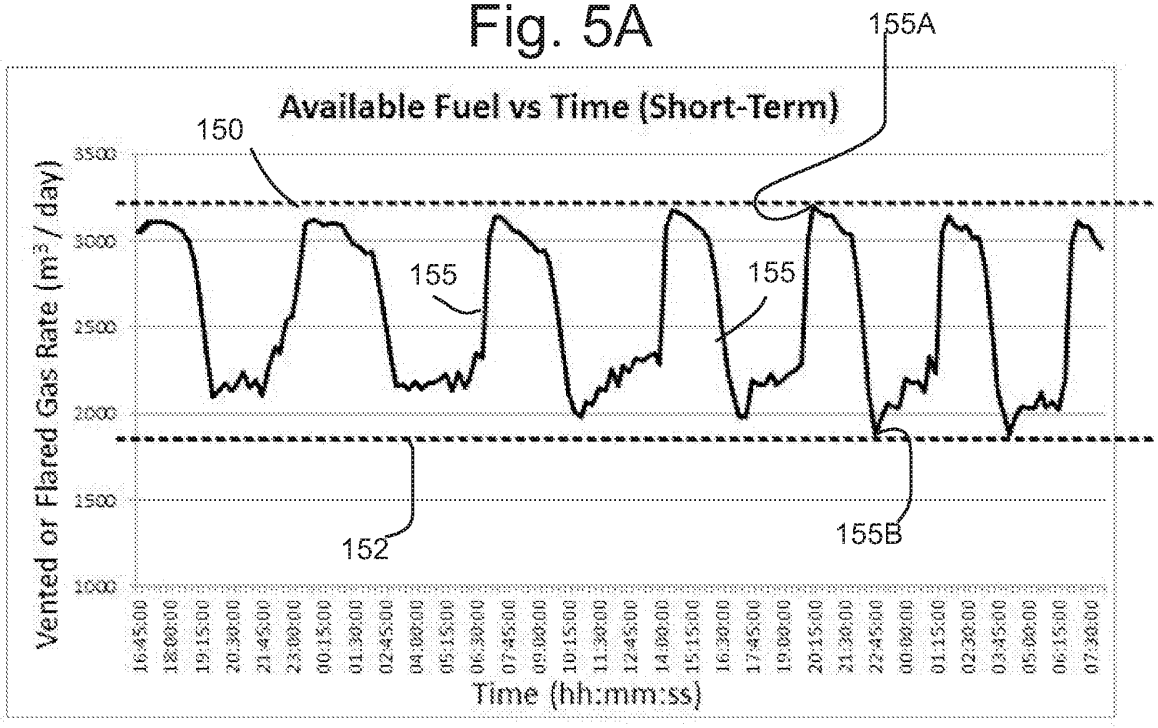

98
92A
92B
92C
92D
92E
92
Mining Processor
Mining Processor
Mining Processor
Mining Processor
Mining Processor
94
96
84
Contactor Panel
Network Equipment
88
82
Distribution Panel
Controller
86
80
74
Splitter
Chiller
78
Ventilation Fan
76
72
M
28
90

Fig. 4

Fig. 5A


155A
Available Fuel vs Time (Short-Term)
150
155
155
152
155B
Vented or Flared Gas Rate (m³ / day)
3500
3000
2500
2000
1500
1000
16:45:00
18:00:00
19:15:00
20:30:00
21:45:00
23:00:00
00:15:00
01:30:00
02:45:00
04:00:00
05:15:00
06:30:00
07:45:00
09:00:00
10:15:00
11:30:00
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14:00:00
15:15:00
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20:15:00
21:30:00
22:45:00
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07:30:00
Time (hh:mm:ss)

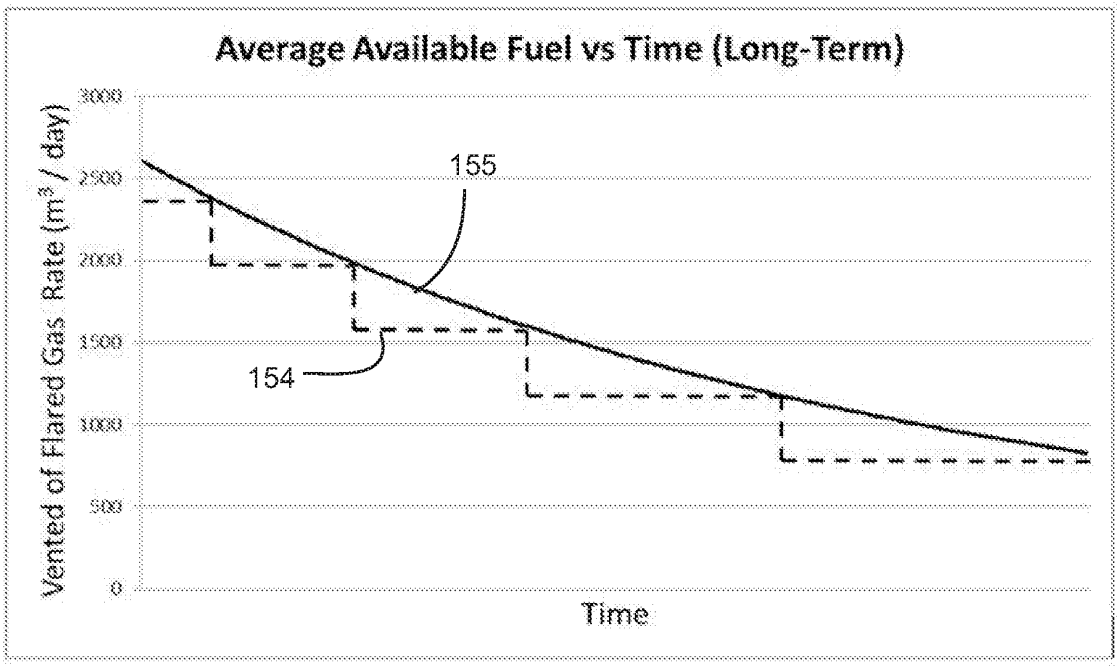

Average Available Fuel vs Time (Long-Term)
155
154
Vented of Flared Gas Rate (m³ / day)
3000
2500
2000
1500
1000
500
0
Time

Fig. 5B

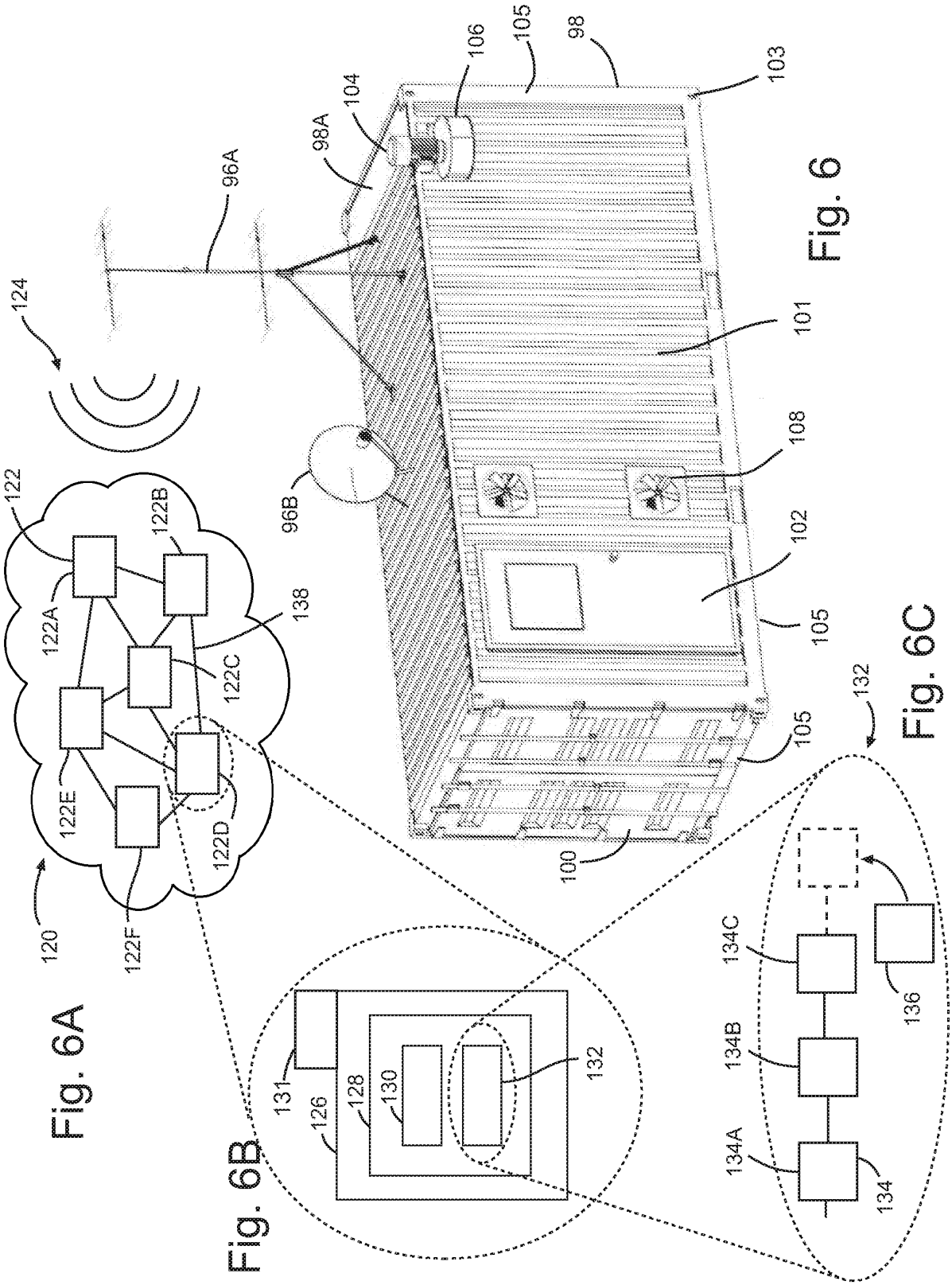


Fig. 6A

Fig. 6

Fig. 6B

Fig. 6C

BLOCKCHAIN MINE AT OIL OR GAS FACILITY

TECHNICAL FIELD

[0001] This document relates to blockchain mining at an oil or gas facility.

BACKGROUND

[0002] At remote oil and gas facilities, excess natural gas is often wasted, for example vented to atmosphere or burned via flaring.

SUMMARY

[0003] A system is disclosed comprising: a source of combustible gas produced from an oil production, storage, or processing facility, such as a remote oil well; a generator connected to the source of combustible gas; and a blockchain mining device connected to the generator.

[0004] A method is disclosed comprising using a source of combustible gas produced at a hydrocarbon production well, storage, or processing facility, to produce electricity to operate a blockchain mining device located at the hydrocarbon production well, storage, or processing facility, respectively.

[0005] A method is disclosed comprising using a source of combustible gas, which is produced from a remote oil or gas well, to produce electricity to operate a blockchain mining device.

[0006] A method is disclosed comprising: disconnecting a source of combustible gas from a gas vent or combustion device at a hydrocarbon production well or processing facility; and connecting the source of combustible gas to produce electricity to operate a blockchain mining device.

[0007] A method is disclosed comprising using a source of combustible gas, which is produced from a remote oil or gas well, to produce electricity to operate a blockchain mining device.

[0008] A method is disclosed of reducing vented or flared natural gas at upstream oil and gas facilities, the method consists of operating a natural gas aspirated prime mover fueled directly by the vented or flared gas source; the prime mover runs a generator to generate power, the generator powers a portable blockchain mine.

[0009] An upstream oil and gas blockchain mining apparatus is disclosed comprising a well, excess gas is captured off the casing of the well to run a natural gas engine, the engine runs both a hydraulic pump and a generator, the generator powers a portable blockchain mine, where the mining load is sized at the low end of the variable availability of gas; excess gas above the amount required to fuel the load is vented, where the mining load is sized at the low end of the variable availability of gas; the prime mover varies its torque

based on the availability of the gas so as to minimize excess vented gas, excess power above the amount necessary to run the mining load is dissipated in a load bank, where the mining load is sized at the high end of the variable availability of gas; and make-up gas is taken from propane tanks on site or from line gas.

[0010] An upstream oil and gas blockchain mining apparatus is disclosed comprising a well, excess gas is captured off the casing of the well to run a prime mover such as an engine, turbine or boiler, the prime mover runs a generator, the generator powers a portable blockchain mine, where the mining load is sized at the low end of the variable availability of gas; excess gas above the amount required to fuel the load is vented, where the mining load is sized at the low end of the variable availability of gas; the prime mover varies its torque based on the availability of the gas so as to minimize excess vented gas, excess power above the amount necessary to run the mining load is dissipated in a load bank, where the mining load is sized at the high end of the variable availability of gas; make-up gas is taken from propane tanks on site or from line gas.

[0011] An upstream oil and gas blockchain mining apparatus is disclosed comprising a multi-well pad or group of satellite wells that produce into an oil treating facility, gas is captured off of the casing of the wells or off of oil and gas separating vessels such as tanks at the treating facility via vapor recovery units or compressors, the gas is used to run a prime mover such as an engine or turbine, the prime mover runs a generator which powers a portable blockchain mine.

[0012] An upstream oil and gas blockchain mining apparatus is disclosed comprising an oil and gas treating facility consists of a flare, incinerator, combustor or burner; excess gas is taken off the inlet line of the flare and redirected to a prime mover such as a natural gas engine, turbine or boiler, the prime mover runs a generator which powers a portable blockchain mining device.

[0013] A portable blockchain mining apparatus is disclosed comprising an enclosure containing the blockchain mining equipment, the enclosure having a ventilation mechanism, to dissipate the heat produced by the mining processors, for example one or more of an air supply fan, an exhaust fan, louvers, and others, the enclosure having a satellite, radio or cellular antenna to provide a connection to the internet, the enclosure containing network equipment such as a modem and network switch, the enclosure designed to be portable such as trailer mounted, the enclosure being insulated from the elements, the enclosure containing a natural gas aspirated engine and a generator to power the mining equipment, and the engine may comprise a turbine, where the enclosure is an intermodal shipping container, where the enclosure has a chiller or air cooling means fitted to it, the enclosure having a back-up heating means, such as a space heater, to be used to pre-heat the enclosure in case of shut down in cold weather.

[0014] In various embodiments, there may be included any one or more of the following features: The oil production, storage, or processing facility comprises a remote oil well. The oil production, storage, or

processing facility comprise an oil storage or processing unit. The system is isolated from a sales gas line and an external electrical power grid. The source of combustible gas comprises the remote oil well; and the remote oil well is connected to produce a continuous flow of combustible gas to power the generator. A combustion engine is connected to the source of combustible gas and connected to drive the generator. The combustion engine is a prime mover that is connected to produce oil from the remote oil well. The combustion engine is a first combustion engine, and further comprising a second combustion engine that is a prime mover that is connected to produce oil from the remote oil well. The source of combustible gas comprises an oil storage or processing unit with a gas outlet connected to supply combustible gas to operate the generator; and the oil storage or processing unit is connected to receive oil produced from a remote oil well. The generator and blockchain mining device are located adjacent to the oil production, storage, or processing facility, for example adjacent to the remote oil well. The remote oil well comprises a plurality of remote oil wells, and one or both of the following conditions are satisfied: the plurality of remote oil wells are located on a multi-well pad; or the plurality of remote oil wells include a satellite well. The blockchain mining device has a network interface and a mining processor; the network interface is connected to receive and transmit data through the internet to a network that stores or has access to a blockchain database; and the mining processor is connected to the network interface and adapted to mine transactions into blocks associated with the blockchain database and to communicate with the blockchain database. The network is a peer to peer network; the blockchain database is a distributed database stored on plural nodes in the peer to peer network; and the blockchain database stores transactional information for a digital currency. A controller is connected to modulate a power load level exerted by the blockchain mining device on the generator, by increasing or decreasing the mining activity of the mining processor. The mining processor comprises a plurality of mining processors; and the controller is connected to modulate the maximum power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining. The source of combustible gas comprises the remote oil well, which is connected to produce a continuous flow of combustible gas to operate the generator. The controller is connected to modulate the power load level in response to variations in a production rate of combustible gas from the remote oil well. A production rate of combustible gas from the remote oil well varies between a daily minimum production rate and a daily maximum production rate; and while the production rate is above the daily minimum production rate, the controller is set to limit the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate. The controller is set to divert to a load bank excess electricity produced by the generator. A production rate of combustible gas from the remote oil well varies between a daily minimum production rate and a daily maximum production rate; the controller is set to limit the power load level to above a power level producible by the generator when the production rate is at

the daily minimum production rate; and a backup source, of fuel or electricity, is connected make up a shortfall in fuel or electricity, respectively, required to supply the blockchain mining device with the power load level. A controller is connected to operate a ventilation, heating and cooling system to maintain the blockchain mining device within a predetermined operating range of temperature. The blockchain mining device is mounted on a skid or trailer. The skid or trailer comprises a generator driven by an engine, which is connected to the source of combustible gas. The engine comprises a turbine. The generator and engine may be mounted integral to the skid, trailer, or blockchain mining device. The blockchain mining device comprises an intermodal transport container. Prior to using the source of combustible gas: disconnecting the source of combustible gas from a combustible gas disposal device at the hydrocarbon production well, storage, or processing facility; and connecting the source of combustible gas to operate the blockchain mining device. Connecting the source of combustible gas to operate the blockchain mining device; and diverting gas from a combustible gas disposal or storage device to operate the blockchain mining device. The combustible gas disposal or storage device comprises one or more of a flare, a vent to the atmosphere, an incinerator, or a burner. The hydrocarbon production well, storage, or processing facility comprises an oil or gas well that is isolated from a sales gas line and an external electrical power grid. The source of combustible gas is a remote oil or gas well, and further comprising producing a continuous flow of combustible gas to power a generator connected to operate the blockchain mining device. Producing further comprises supplying combustible gas to a combustion engine that is connected to drive the generator. The source of combustible gas is a remote oil well, and further comprising using the combustion engine as a prime mover to produce oil from the remote oil well. Prior to using the source of combustible gas, the combustion engine is under loaded as the prime mover, and further comprising connecting the generator to a power takeoff connected to the combustion engine. The combustion engine is a first combustion engine, and further comprising: prior to supplying combustible gas to the first combustion engine, connecting the first combustion engine to receive combustible gas from the remote oil well; and using a second combustion engine as a prime mover to produce oil from the remote oil well. Operating the blockchain mining device to: mine transactions with the blockchain mining device, for example by mining the most recent block on the blockchain with the blockchain mining device,; and communicate wirelessly through the internet to communicate with a blockchain database. Modulating, using a controller, a power load level exerted by the blockchain mining device on the generator, by increasing or decreasing the mining activity of the blockchain mining device, for example the mining activity of plural mining processors contained within the blockchain mining device. The blockchain mining device comprises a plurality of mining processors; and modulating comprises modulating the power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining. Modulating comprises modulating the power load level in response to variations in a production rate of combustible gas from the

remote oil or gas well. A production rate of combustible gas from the remote oil or gas well varies between a daily minimum production rate and a daily maximum production rate; and modulating comprises limiting, while the production rate is above the daily minimum production rate, the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate. One or more of: diverting to a load bank excess electricity produced by the generator; or diverting, to a combustible gas disposal or storage device, excess combustible gas supplied to operate the generator. A production rate of combustible gas from the remote oil or gas well varies between a daily minimum production rate and a daily maximum production rate; and modulating comprises limiting the power load level to above a power level produced by the generator when the production rate is at the daily minimum production rate; and supplying from a backup fuel or electricity source a shortfall in fuel or electricity, respectively, required to supply the blockchain mining device with the power load level. The power load level is limited to above a power level produced by the generator when the production rate is at the daily maximum production rate. The blockchain mining device may be replaced by a suitable mining device or data center. The prime mover is connected to drive a pump jack or a rotating drive head mounted to the remote oil well. The power unit comprises a generator driven by a power take off from the prime mover. A compressor is connected to pressurize natural gas supplied from the source of natural gas to the power unit. The source of combustible gas comprises raw natural gas. The remote oil well comprises a plurality of remote oil wells. The network interfaces comprises one or more of a satellite, cellular, or radio antenna, connected to a modem. Successfully mining a block by a mining processor provides a reward of the digital currency, and the reward is assigned to a digital wallet or address stored on a computer readable medium. Prior to using the source of combustible gas, disconnecting the source of combustible gas from a gas vent or combustion device; and connecting the source of combustible gas to operate the blockchain mining device. The source of vented or flared natural gas is derived from combustible vapors produced as a result of oil treating or processing, such as an oil storage tank, separating vessel, or a free water knockout. The source of vented or flared natural gas is sourced from the inlet line of a flare, incinerator, combustor or burner. Retrofitting an existing natural gas engine running a hydraulic pump to also run a generator, the generator powering a portable blockchain mine. Adding secondary prime movers such as natural gas internal combustion engines, turbines or boilers to run associated generators, the generators powering a portable blockchain mine. The mining load is sized at the low end of a variable vented or flared gas supply such that back-up fuel requirement usage is minimized, the excess gas over and about the amount required to fuel the mining load is vented or flared (combusted). The mining load is sized at the low end of a variable vented or flared gas supply such that back-up fuel requirement usage is minimized, the engine is controlled to throttle up or down based on the availability of excess gas so as to produce more torque, the additional torque

generates excess power above that required to run the mining load, the excess power is directed to a load bank and dissipated as heat, and thus venting is minimized. The electrical load (of the mining hardware) is sized at the high end of a fluctuating excess or stranded gas supply such that venting or flaring is minimized or eliminated, where shortages in gas supply are made up from available back-up fuel such as propane or line gas. Changing the blockchain mine electrical load over time in response to changes in the excess or stranded gas volume availability. The mining load can be changed through the addition or removal of mining processors. Minimizing the vented or flared gas volumes by changing the mining hardware load in reaction to observed changes in average natural gas source rates over time. Minimizing the consumed back up fuel volumes by changing the mining hardware load in reaction to observed changes in average natural gas source rates over time.

[0015] These and other aspects of the device and method are set out in the claims, which are incorporated here by reference.

BRIEF DESCRIPTION OF THE FIGURES

[0016] Embodiments will now be described with reference to the figures, in which like reference characters denote like elements, by way of example, and in which:

[0017] Fig. 1 is a schematic illustrating a system for powering a blockchain mine at a remote oil well using a generator retrofitted to a prime mover, which operates a drivehead to pump oil up from the reservoir.

[0018] Fig. 2 is a schematic illustrating another embodiment of a system for powering a blockchain mine at a remote oil well, with a prime mover (engine) operating the drivehead, and another engine and generator connected to the remote well for powering the blockchain mine independent of the prime mover that operates the drive head.

[0019] Fig. 3 is a schematic illustrating another embodiment of a system for powering a blockchain mine, in which a generator and engine are connected to be powered by combustible gas taken off of an oil storage unit to power the blockchain main.

[0020] Fig. 4 is a schematic depicting a blockchain mining device with a plurality of mining processors and associated control and network equipment housed within a portable enclosure.

[0021] Fig. 5A is a graph that illustrates short-term changes in available natural gas produced over time by an oil production, storage, or processing facility.

[0022] Fig. 5B is a graph that illustrates long-term changes in available natural gas produced over time by an oil production, storage, or processing facility.

[0023] Fig. 6 is a perspective view of an intermodal shipping container housing blockchain mining equipment for use at a remote oil or gas production, storage, or processing facility.

[0024] Figs. 6A, 6B, and 6C are diagrams that illustrate a) a peer-to-peer network, b) a layout of hardware forming a single node in the peer-to-peer network, and c) a conceptual illustration of a blockchain database stored on an individual node, respectively.

DETAILED DESCRIPTION

[0025] Immaterial modifications may be made to the embodiments described here without departing from what is covered by the claims.

[0026] Natural gas is a naturally occurring combustible gas, often in the form of a mixture of hydrocarbon gases that is highly compressible and expansible. Methane (CH_4) is the chief constituent of most natural gas (constituting as much as 85% of some natural gases), with lesser amounts of ethane, propane, butane, and pentane. Impurities may also be present in large proportions, including carbon dioxide (CO_2), helium, nitrogen, and hydrogen sulfide (H_2S).

[0027] Natural gas may be produced from various sources. Natural gas may naturally separate from the oil stream as it is produced up the well and may be captured off the casing side of the well, the casing side referring to the annular space between the production tubing and the well bore or well casing if present. When natural gas is produced from an underground reservoir, it may be saturated with water vapor and may contain heavy hydrocarbon compounds as well as nonhydrocarbon impurities. Natural gas produced from shale reservoirs is known as shale gas. The composition of the gas stream is a function of the thermal maturity of the rock. Thermally immature rocks will contain heavier hydrocarbon components and may contain liquid components. Overmature reservoirs may contain appreciable quantities of CO_2. Natural gas may also be liberated out of solution from the oil as it is treated, such as in a tank on the well site or as it is undergoes further refinement at a downstream facility. In upstream production of oil and gas, natural gas may be produced as the primary product, for example from a gas well, or as a by-product of oil production, for example from an oil well.

[0028] Natural gas produced as a by-product of oil production may be used in various ways. The oil well operator may attempt to capture the gas and consume it, for example as on-site fuel for equipment or for instrumentation pressure. If there is an excess of natural gas that cannot be used on site, it may be desirable to sell the excess by tying the source into a pipeline network with a sales line to sell to a customer connected to the pipeline network. If the amount of gas is significant, it can be compressed or liquefied into storage vessels

to be sold to market. If there is no pipeline network but there is a power grid, the operator may have the option to use the gas to generate electricity to sell to the power grid owner.

[0029] Raw natural gas may require processing before it can be sold via a sales gas line. In long distance transmission of sales gas by pipeline, the pressure is usually less than 1,000 pounds per square inch gage (PSIG). It is important that no liquids form in the line because of condensation of either hydrocarbons or water. Hydrocarbon liquids reduce the pipeline efficiency and might hold up in the line to form liquid slugs, which might damage downstream compression equipment. Condensed water can do the same damage. Additionally, water may form solid complexes (hydrates), which accumulate and block the line. Further, it may be economical to extract liquefiable hydrocarbon components, which would have a higher market value on extraction as compared with their heating value if left in the gas.

[0030] The end user of natural gas needs to be assured of two conditions before committing to the use of gas in a home or factory: the gas must be of consistent quality, meeting sales gas specifications, and the supply of gas must be available at all times at the contracted rate. Gas treating facilities, therefore, must be designed to convert a particular raw gas mixture into a sales gas that meets the sales-gas specifications, and such facilities must operate without interruption. Typical processing steps include inlet separation, compression, gas sweetening, sulfur recovery or acid gas disposal, dehydration, hydrocarbon dewpoint control, fractionation and liquefied petroleum gas (LPG) recovery, and condensate stabilization. Sales gas specifications may vary by jurisdiction, although Table 1 below illustrates a typical specification. A sales gas line may be a pipeline of more than ten km of length, in some cases more than fifty, a hundred, or two hundred, kilometers in length, and connecting between an oil and gas site and travelling to an end user, a processing site, or a distribution site.

[0031] Table 1: Typical Sales Gas Specification

Component	Sales Gas Specification (maximum limits)
H2S (ppm)	10-16
O2 (mol. %)	0.0
CO2 (mol. %)	2-3
Moisture (mg/L and lb/mmscf)	0.1-.16 (4-10)

[0032] A source of natural gas may be located at a remote oil and gas site, for example one that is lacking in accessible infrastructure such as an external pipeline network (sales line) or external power grid to sell into. In many locations it may not be economically feasible to build the infrastructure required to take the produced gas, or resultant electricity generated by combustion of the gas, to market, for example due to

significant capital expense required or when the volume of gas is insufficient to pay out the investment. In such cases, the operator is forced to do something with the excess or stranded gas and is left with few options. Such options currently include venting the gas to atmosphere un-combusted, combusting the gas on site via flare, incinerator, or combustor, or worst case scenario ceasing production of the gas source, for example shutting in the oil well.

[0033] Venting excess gas to atmosphere is the most cost effective option for the operator but may have the most negative impact on the environment, as excess natural gas is regarded as 25-35 times worse than CO_2 as a greenhouse gas on a 100 year global warming potential timescale. Currently, venting gas to atmosphere is a common occurrence in oil production all over the world, as few jurisdictions restrict this practice.

[0034] Combustion disposal options, while more environmentally friendly than venting, represent a significant capital expense and do not provide utility for the operator. Combustion options include, but are not limited to, flaring and incineration. Combustion disposal methods produce waste heat and essentially represent waste of the potential energy of the gas. Such options may represent a capital liability to the operator, as such do not generate any revenue. Both combustion and venting can pose health concerns to nearby residents and are typically considered a nuisance.

[0035] Selling excess gas to a pipeline, i.e. a sales gas line, or using the gas to generate electricity to sell to an external power grid may be ideal options, but such options may require a significant capital expense when there is no infrastructure nearby. To pay off the capital expense, the volume of excess gas must be significant and the supply must also be guaranteed for the payout period. This is often not the case in many upstream oil production activities, as gas volumes associated with oil production can quickly diminish. Many remote oil and gas sites are located in unpopulated areas that are hundreds of kilometers outside of the nearest town, and of which no viable sales option is economically feasible.

[0036] An external power grid may be an electrical power transmission system comprising overhead or underground wiring, often supplying electricity in polyphase form, and spanning an electrical substation to an oil and gas site. Long-distance electricity transmission is typically carried with high voltage conductors. Transmission lines traverse large regions and require numerous support towers, often spanning hundreds of kilometers from generation to distribution and end use. Substations transform power from transmission voltages to distribution voltages, typically ranging from 2400 volts to 37,500 volts.

[0037] Referring to Figs. 1-3, a system 10 is illustrated comprising a source of combustible gas, for example natural gas or another hydrocarbon gas, produced from a hydrocarbon production, storage, or processing facility, in this case a remote oil well 14, a power unit such as a generator 28, and a blockchain

mining device 12. The generator 28 is connected to produce electricity from the source of natural gas. The data mining or blockchain mining device 12 is connected to the generator 28, for example connected to receive electricity from or be powered by the generator 28. Referring to Fig. 2, an oil well 14 may include a suitable production tree 110, which may include a drivehead 16, a stuffing box 114, a flow tee 117, and a casinghead 15, all mounted on a wellhead 116.

[0038] Referring to Figs. 1-3, the remote oil or gas well 14 may be isolated from one or more of a sales gas line or external power grid. Isolated may refer to the fact the no sales gas line or external power grid, as the case may be, is located within a distance that would be economically feasible to connect into, for example such infrastructure may be more than five, ten, fifty, or a hundred kilometers away. Oil and gas production, storage, and processing assets are often distributed across remote locations. For example, well-sites can be remote and isolated from conventional communications equipment making the retrieval of well-site data difficult and unreliable. Some locations can be so remote, that periodic on-site visits are required to manually or semi-manually retrieve data. Some locations are only accessible via off-road vehicles or helicopter.

[0039] Referring to Figs. 1-2, the combustible gas used in the systems and methods in this document may be natural gas, such as raw natural gas and/or casing gas. Casing gas, also known as casinghead gas, is gas produced as a byproduct from a producing oil well 14. Referring to Fig. 1, casing gas is taken from the well 14 through the casinghead 15 at the top of the well 14. The casinghead 15 is in fluid communication with the annulus defined between the production tubing and the well bore or well casing lining the well bore. The casinghead may feed raw natural gas via supply line 41 to a gas tree 22, which may distribute the gas to the various pieces of equipment on site that may use or dispense of the gas. Raw gas may be a gas directly produced from the well, or otherwise unprocessed. Raw gas may contain natural gas liquids (condensate, natural gasoline, and liquefied petroleum gas), water, and some other impurities such as nitrogen, carbon dioxide, hydrogen sulfide and helium.

[0040] Referring to Figs. 1-3, the generator 28 and blockchain mining device 12 may be positioned at a suitable location relative to the hydrocarbon well, storage site, or processing facility, such as remote oil well 14. The generator 28 and blockchain mining device 12 may be located adjacent to the remote oil well 14, for example within one hundred meters. The generator 28 and blockchain mining device 12 may be located further distances away, for example within one kilometer of the remote oil well 14. Relatively longer distances may permit the device 12 to be powered by combustion of gas from plural wells 14 as described below.

[0041] Referring to Figs. 1-2, as above, system 10 may be located at a remote oil well. In the examples shown, the source of combustible gas comprises the remote oil well, 14. As the source of gas the remote oil well 14 may be connected to produce a continuous flow of combustible gas to power the generator 28, for example by supply of combustible gas to a combustion engine 24 that is connected to drive the generator 28.

[0042] Referring to Fig. 1, at a remote oil well site an internal combustion engine 24, such as a motor, may be set up to operate as, or to drive, a prime mover, such as a pump jack or rotating drivehead 16, which is connected to produce oil from the remote oil well 14. A prime mover in this document refers to any machine that converts energy from a source energy into mechanical energy, as a motive power source providing energy to move the components that pump oil from the well 14. A pumpjack converts the rotary motion of a driveshaft of the engine 24 to a vertical reciprocating motion of a walking beam to raise and lower the pump shaft (polished rod) to operate a downhole pump positioned at the base of production tubing in the well. A rotating drivehead 16 is a top side motor that rotates the polished rod to operate a downhole moineau or progressing cavity pump, which in turn drives oil up the production tubing to surface. Driveheads and pumpjacks are examples of artificial lift systems, other examples of which include bottom hole motors. A rotating drivehead may incorporate a hydraulic motor that is driven by a hydraulic pump 26, which is driven by the prime mover or engine 24, for example via supply and return hydraulic lines 18 and 20. At many remote oil wells 12 the prime mover or engine 24 is connected to receive as fuel natural gas from the source of combustible gas, in this case well 14, for example via gas tree 22 and supply line 54.

[0043] Referring to Fig. 1, the prime mover engine 24 may be connected to drive the generator 28. In one case the generator 28 is connected, in some cases retrofitted, to a power takeoff on the engine 24, such as a drive shaft. In some cases the drive shaft also operates the hydraulic pump 26, or drives the gearbox of a pumpjack. The remote oil well 14 may produce natural gas as a by-product off an annulus of the well 14 or other space between adjacent sections of piping, tubing, and / or casing positioned within the well 14. The generator 28 may be any device that converts mechanical energy to electrical energy, such mechanical energy being converted from energy of combustion of the combustible gas. The engine 24 may be a natural aspirated internal combustion engine. The combination of the generator 28 and the engine 24 may be referred to as a genset or engine-generator. The generator 28 may be an alternator, a gas turbine generator, a boiler coupled with a steam-powered generator, or other suitable devices.

[0044] Referring to Fig. 1, the generator 28 may be used to leverage excess energy available when the prime mover engine 24 is under loaded. For example, an engine 24 may be rated at 60 or higher horsepower, but may actually only require 20-30 horsepower to pump the well 14. In such a case the well 14

is a good candidate for retrofitting a generator 28 to leverage the excess power capacity of the engine 24. The generator 28 may thus be connected, for example through a power takeoff, to the combustion engine 24. In other cases the generator 28 may be connected to a mechanical energy source elsewhere in the existing power train, for example to the gearbox or crank assembly of a pump jack, or to a hydraulic motor connected to the pump 26. In other cases, the well site may have an existing generator 28 in place, for example already connected to be driven by the engine 24, and in such a case the mining device 12 may be connected to such generator 28 to receive power for operations.

[0045] Referring to Fig. 2, the mining device 12 may be powered by a generator 28 that is retrofitted, or already present, at a well site independent of the prime mover engine 24. One or more such components may be housed in an enclosure such as an engine building 50. In the example shown during operation the generator 28 is connected to be driven by an engine 56, referred to as a first engine, while a second engine 24 is present to act as the prime mover to pump the well 14. Prior to using the combustible gas to power the mining device 12, a user may connect the generator 28 to an existing engine 56, or may connect a gen-set comprising engine 56 and generator 28 to the gas supply, such as through lines 43 connected to a gas tree 22 on site. The engine 56 and generator 28, or just the generator 28, may be supplied as part of the mining device 12 in some cases, for example as a skid or trailer-mounted unit, in order to provide a turnkey or plug-and-play system that may be transported to the well 14, hooked up to the gas supply or tree 22, and operated.

[0046] Referring to Fig. 3, the mining device 12 may be powered by gas from a plurality of sources, such as a plurality of remote oil wells 14A-D. The plurality of remote oil wells 14A-D may be located on a multi-well pad 118, for example a plurality of horizontal wells that penetrate the same hydrocarbon reservoir. The plurality of remote oil wells 14A-D may include one or more satellite wells. A satellite well includes a well that is separate from a main group of wells or another well, but whose production is directed to a common processing facility. A satellite well may include a well that penetrates the same hydrocarbon reservoir as other wells in the plurality of wells. Each of the plurality of remote oil wells 14A-D may have respective casinghead gas lines 60 and oil or emulsion lines 58, which in the examples shown are bussed or grouped together, though such grouping is not necessary and in some cases independent lines may be used for each well or a group of one or more wells. The gas supply line or lines 60 may feed an engine 56 that drives a generator 28 that powers a mining device 12.

[0047] Referring to Fig. 3, the source of combustible gas may be an oil storage or processing unit, for example a production storage tank or tanks 34A-B. The tanks 34 may store emulsion, for example a mixture of oil and water, which may be supplied via one or more emulsion or oil lines 58 from wells 14A-D.

The source of natural gas may comprise oil storage production tank 34 connected to receive oil produced from the remote oil well 14. Oil storage production tank 34 may store, and in some cases separate, emulsion 38, which may release vapor such as combustible gas 36 over time. A gas outlet, such as a vapor recovery unit 66, may be connected to supply natural gas from the oil storage production tank 34 to the engine 56. A compressor 62 or other suitable device may be used to pressurize the gas supplied to engine 56. The engine 56 and generator 28 may form a standalone unit or may be connected for other functions on the site, such as to pump a well or power communications or electrical equipment. Pressurized natural gas from compressor 62 may be used to fuel lease equipment 64, such as control equipment, communications equipment, surveillance equipment, heaters, or other components. Excess or unused gas may be directed to a gas disposal or storage device such as an atmospheric vent or combustion device, in this case a flare 68. Gas may be diverted from flare 68 to engine 56 via an excess gas line 70.

[0048] Referring to Fig. 3, in some cases a method of installing the system 10 on site includes reducing the amount of combustible gas that is wasted on site. For example, the method of install may include disconnecting the source of combustible gas, in this case from tanks 34 and/or line 60, from an atmospheric vent or combustion device, in this case flare 68, or to atmosphere via a vent 52 (Fig. 1). The source of combustible gas may be initially connected to operate the blockchain mining device 12. Once disconnected, the atmospheric vent or combustion device may be unused in the future, or may be used only in certain circumstances. In some cases combustible gas is diverted at least partially from the atmospheric vent or combustion device to operate the blockchain mining device 12, so that relatively less gas is wasted during operation. In such cases the flare 68 may remain connected to the source of gas, for example to receive a lesser feed of gas than prior to the installation of mining device 12, and in other cases to receive diverted excess gas in certain circumstances for example as described further elsewhere in this document. An atmospheric vent or combustion device is an example of a gas disposal device, and includes a flare, a vent to the atmosphere, an incinerator, a burner, and other suitable devices.

[0049] A blockchain is a form of database, which may be saved as a distributed ledger in a network of nodes that maintains a continuously-growing list of records called blocks. Each block contains a timestamp and a link to a previous block. The data in a block cannot be altered retrospectively without significant computational effort and majority consensus of the network. The first blockchain was conceptualised by Satoshi Nakamoto in 2008 and implemented the following year as a core component of the digital currency, BITCOIN (TM), where it serves as the public ledger for all transactions. Through the use of a peer-to-peer network and a distributed timestamping server, a blockchain database is managed autonomously. The administration of BITCOIN (TM) currency is currently the primary use for blockchain technology, but there

are other use cases for blockchain technology to maintain accurate, tamper-proof databases. Examples include maintaining records of land titles and historical events. While the potential in blockchain technology is vast, BITCOIN (TM) remains the most widely used today.

[0050] By design blockchains are inherently resistant to modification of the data — once recorded, the data in a block cannot be altered retroactively without network consensus. Blockchains are an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way. The ledger itself can also be programmed to trigger transactions automatically. Blockchains are secure by design and an example of a distributed computing system with high byzantine fault tolerance. Decentralised consensus can therefore be achieved with a blockchain. This makes blockchains suitable for the recording of events, medical records, and other records management activities, identity management, transaction processing and proving provenance. This offers the potential of mass disintermediation and vast repercussions for how global trade is conducted.

[0051] A blockchain facilitates secure online transactions. A blockchain is a decentralized digital ledger that records transactions on thousands of computers globally in such a way that the registered transactions cannot be altered retrospectively. This allows the participants to verify and audit transactions in an inexpensive manner. Transactions are authenticated by mass collaboration powered by collective self-interests. The result is a robust workflow where participants' uncertainty regarding data security is marginal. The use of a blockchain removes the characteristic of infinite reproducibility from a digital asset. It confirms that each unit of digital cash was spent only once, solving the long-standing problem of double spending. Blockchains have been described as a value-exchange protocol. This exchange of value can be completed more quickly, more safely and more cheaply with a blockchain. A blockchain can assign title rights because it provides a record that compels offer and acceptance. From the technical point of view a blockchain is a hashchain inside another hashchain.

[0052] A blockchain database may comprise two kinds of records: transactions and blocks. Blocks may hold batches of valid transactions that are hashed and encoded into a Merkle tree. Each block may include the hash of the prior block in the blockchain, linking the two. Variants of this format were used previously, for example in Git, and may not by itself be sufficient to qualify as a blockchain. The linked blocks form a chain. This iterative process confirms the integrity of the previous block, all the way back to the original genesis block. Some blockchains create a new block as frequently as every five seconds. As blockchains age they are said to grow in height. Blocks are structured by division into layers.

[0053] Sometimes separate blocks may be validated concurrently, creating a temporary fork. In addition to a secure hash based history, each blockchain has a specified algorithm for scoring different

versions of the history so that one with a higher value can be selected over others. Blocks that are not selected for inclusion in the chain are called orphan blocks. Peers supporting the database don't have exactly the same version of the history at all times, rather they keep the highest scoring version of the database that they currently know of. Whenever a peer receives a higher scoring version (usually the old version with a single new block added) they extend or overwrite their own database and retransmit the improvement to their peers. There is never an absolute guarantee that any particular entry will remain in the best version of the history forever, but because blockchains are typically built to add the score of new blocks onto old blocks and there are incentives to only work on extending with new blocks rather than overwriting old blocks, the probability of an entry becoming superseded goes down exponentially as more blocks are built on top of it, eventually becoming very low. For example, in a blockchain using the proof-of-work system, the chain with the most cumulative proof-of-work is always considered the valid one by the network. In practice there are a number of methods that can demonstrate a sufficient level of computation. Within a blockchain the computation is carried out redundantly rather than in the traditional segregated and parallel manner.

[0054] Maintaining a blockchain database is referred to as mining, which refers to the distributed computational review process performed on each block of data in a block-chain. This allows for achievement of consensus in an environment where neither party knows or trusts each other. Those engaged in BITCOIN (TM) mining are rewarded for their effort with newly created BITCOIN (TM)s and transaction fees, which may be transferred to a digital wallet of a user upon completion of a designated task. BITCOIN (TM) miners may be located anywhere globally and may be operated by anyone. The mining hardware is tied to the blockchain network via an internet connection. Thus, little infrastructure is needed to operate and contribute to the system. All that is required to become a BITCOIN (TM) miner is the appropriate computer hardware, an internet connection and low cost electricity. The cheaper the electricity the more reward the miner will receive relative to competition, other miners.

[0055] Mining is the process of adding transaction records to BITCOIN (TM)'s public ledger of past transactions. This ledger of past transactions is called the blockchain as it is a chain of blocks. The blockchain serves to confirm transactions to the rest of the network as having taken place. BITCOIN (TM) nodes use the blockchain to distinguish legitimate BITCOIN (TM) transactions from attempts to re-spend coins that have already been spent elsewhere. Mining may be intentionally designed to be resource-intensive and difficult so that the number of blocks found each day by miners remains steady. Individual blocks may be required to contain a proof-of-work to be considered valid. This proof-of-work is verified by other BITCOIN (TM) nodes each time they receive a block. BITCOIN (TM) uses the hashcash proof-of-work function.

[0056] One purpose of mining is to allow BITCOIN (TM) nodes to reach a secure, tamper-resistant consensus. Mining may also be the mechanism used to introduce BITCOIN (TM)s into the system: Miners are paid any transaction fees as well as a subsidy of newly created coins. This both serves the purpose of disseminating new coins in a decentralized manner as well as motivating people to provide security for the system. BITCOIN (TM) mining is so called because it resembles the mining of other commodities: it requires exertion and it slowly makes new currency available at a rate that resembles the rate at which commodities like gold are mined from the ground.

[0057] Mining requires computational effort in the form of CPU cycles (CPU = central processing unit or central processor) to run a cryptographic hashing algorithm associated with the particular blockchain protocol. For a given mining processor, one can modify the computational effort through changing the core voltage or the clock rate of the processor. Doing so may result in more or less power consumed by the mining processor, and in some embodiments within this document such changes are described as changing the mining activity, or hashrate.

[0058] As the total network computational effort (or hashrate) increases on a blockchain over time, the probability for an individual miner to find a block and receive a reward diminishes. Today the BITCOIN (TM) network is so large that most individuals engaged in mining BITCOIN (TM) typically mine in pools using protocols such as the Stratum Mining Protocol. This allows individual miners to increase their reward frequency as a trade-off for splitting the block reward with the rest of the pool. Miners who are pool mining do not need the associated equipment needed to run a mining node as they only need compute and submit proof-of-work shares issued by the mining pool.

[0059] Since the energy cost of running blockchain mining equipment is its primary operating cost, a trend towards mining on low-cost hydroelectric power has become prevalent. This trend has promoted the centralization of blockchain miners in specific countries with abundant hydroelectric power, as miners who do not have access to cheap hydroelectricity cannot mine profitably because they are competing with the miners who do have access. BITCOIN (TM) mining centralization has been occurring in China where there is abundant low cost hydroelectric power. Centralization in blockchain mining is undesirable because the premise behind the blockchain innovation is not to have to trust a third party and to have inherent confidence and security through a decentralized, distributed network. There exists a need to further decentralize BITCOIN (TM) and other blockchain mining through a more decentralized source of low-cost power.

[0060] Referring to Fig. 6A, a blockchain network may be a peer to peer network 120 accessible via the internet. The blockchain database may be stored as a distributed database 132 on plural nodes 122, for example nodes 122A-F, in the peer to peer network 120. A protocol may be put in place to ensure that each

copy of the database on each node is updated in a reliable fashion when one copy is updated on one node. Each copy of the blockchain database may store transactional information for a digital currency such as BITCOIN (TM). Nodes 122A-F may be electronic devices 126, for example desktop computers, laptop computers, tablet computers, cellular telephones, servers, or other suitable devices. Nodes 122A-F may communicate with one another over wired or wireless communication paths 138, for example through the internet. Each path 138 may be created through communication via switches, routers, modems, and other network equipment. Network 120 may include any number of nodes, for example tens, hundreds, thousands, millions, or more nodes. Nodes 122A-F may communicate to maintain a distributed global ledger of all official transactions. One or more of the nodes 122A-F may store a copy of the global ledger, for example a complete copy of the global ledger or a partial copy of the global ledger.

[0061] Referring to Fig. 6B, each node 122 may correspond to and be defined by a physical device 126, such as a computer. Device 126 may have one or more of storage and processing circuitry 128 and mining circuitry 130 if the node operates as a miner. Storage and processing circuitry 128 may have storage circuitry, for example hard disk drive storage, nonvolatile memory such as flash memory or other electrically-programmable-read-only memory configured to form a solid state drive, or volatile memory such as static or dynamic random-access-memory. Processing circuitry of storage and processing circuitry 128 may be used to control the operation of device 126. Storage circuitry 128 may store one or more copies of a portion or the entirety of the distributed database 132. Such processing circuitry may include suitable hardware components such as microprocessors, microcontrollers, and digital signal processors, or dedicated processing circuits such as application specific integrated circuits. Mining circuitry 130, for example an integrated circuit chip, may be used to perform data mining operations, for example verifying cryptocurrency transactions. Network communication hardware 131 may be used to communicate with other nodes and the network in general.

[0062] Referring to Figs. 6A-B, every transaction added to the global ledger via nodes 122 may be verified by other the other nodes to help ensure validity of the ledger. Successfully mining a block may provide a reward of the digital currency, wherein, the processor circuitry 128 or another processor may assign the reward to a digital wallet or address stored on a computer readable medium.

[0063] Referring to Fig. 6C, storage and processing circuity 128, may maintain or store a blockchain database 132. The blockchain database 132 may store data as a series of interconnected blocks 134, for example blocks 134A-C. Each block 134 may have a respective header and contents and the header may contain the previous block's hash. Such information may be used in linking a new block, for example block 136, into the blockchain database 132. A new block 136 may be added to the chain as transactions are verified and confirmed into the blockchain. The integrity of the blockchain may be verified by known

methods, and the linking of each block to previous blocks acts to create a liable and traceable path of title to anonymously but reliably verify a chain of title for a specific quantity of currency that has been the subject of one or more transactions.

[0064] Referring to Fig. 4, each blockchain mining device 12 may be composed of suitable components. The blockchain mining device 12 may have a network interface, such as network equipment 88, and one or a plurality of mining processors 92 (92A-92E for example). The network interface may be connected to receive and transmit data through the internet to a node on the network 120 (Fig. 6A), or to a mining pool (not shown), that stores or has access to a blockchain database, which may be for a digital currency. The mining processor or processors may be connected to the network interface and adapted to mine new transactions into the blockchain database and to communicate with the blockchain database. Referring to Fig. 4, the network interface or interfaces (network equipment 88) may have a configuration suitable for receiving and transmitting data through the internet to the network. Referring to Fig. 6, a network interface may comprise one or more communication device such as a network antenna 96A, a satellite antenna or dish 96B, a cellular antenna, or a radio antenna. The network equipment 88 may include or be connected to a modem.

[0065] Referring to Fig. 6, system 10 may be mounted within a portable enclosure 98 suitable for transporting blockchain mining device 12 between locations. The blockchain mining device 12 (Fig. 1) may be skid or trailer-mounted. The blockchain mining device 12 may be located in a portable enclosure 98, for example an intermodal transport container as shown. The portable enclosure 98 may have an access door 102 such as a man door, for example to permit entry and exit of a person such as equipment maintenance staff into and out of the enclosure 98. Portable enclosure 98 may have an end gate 100 to permit entry and exit of data mining equipment, for example mining processors 92, or power generating equipment such as engine 56 and generator 28, into and out of the enclosure 98. One or more network communications equipment 96, for example network antenna 96A such as a cellular network antenna or radio network antenna and / or satellite internet dish 96B may be mounted to the enclosure 98, for example to a top side 98A of the enclosure 98 or at another suitable location. Enclosure 98 may have an air supply, such as a centrifugal fan 106, for example driven by a motor 104, in order to cool and ventilate internal components to prevent system downtime or damage from overheating. Enclosure 98 may have one or more exhaust fans 108 and / or louvers, for example to facilitate air flow out of, or into, enclosure 98 for heat dissipation from enclosure 98. Enclosure 98 may have an air supply, such as an air supply fan 106, and may have an air supply filter (not shown) and conditioning equipment such as a dehumidifier (not shown) to provide a quality air supply for the enclosure 98.

[0066] Referring to Fig. 6, an intermodal container is a relatively large rectangular box-shaped standardized shipping container, designed and built for intermodal freight transport, meaning these containers can be used across different modes of transport – from ship to rail to truck – without unloading and reloading their cargo. Intermodal containers are primarily used to store and transport materials and products efficiently and securely in the global containerized intermodal freight transport system, but smaller numbers are in regional use as well. These containers are known under a number of names, such as simply container, cargo or freight container, ISO container, shipping, sea or ocean container, container van or (Conex) box, or seacan. Intermodal containers exist in many types and a number of standardized sizes, but ninety percent of the global container fleet are so-called dry freight or general purpose containers, which are durable closed steel boxes, mostly of either twenty or forty foot standard length. Common heights are 8 feet 6 inches and 9 feet 6 inches– the latter are known as High Cube or Hi-Cube containers. Intermodal containers often include corrugated walls 101 for strength. Each corner of the container may include a twistlock fitting 103 for securing the container to other containers and to various transportation devices such as a container trailer for a road-based tractor unit. Reinforcing beams 105 may span the edges of the container, for example the vertical columns that make up the four corners between sidewalls, and the horizontal beams that make up the longitudinal and lateral side edges of the base of the container.

[0067] Referring to Fig. 4, an example layout is illustrated of the components that may make up a mining device 12. The enclosure 98 may contain one or more of a meter 72, a splitter 74, a ventilation fan 76, a chiller 78, a step-down transformer 80, a distribution panel 82, a contactor panel 84, a controller 86, network equipment 88 such as a modem and a network switch, a thermistor or temperature sensor 90, and one or more mining processors 92 such as processors 92A-E. The generator 28 provides power to the mining device 12. In some cases, the power is metered via meter 72 so the user can know how much to pay the owner of the gas, and then the power may be split up.

[0068] Referring to Fig. 4, the generator 28 may produce polyphaser power, such as three phase power, which may be useful to run large loads such as the ventilation fan 76 and chiller 78. The power may travel into a step-down transformer 80. A transformer 80 may or may not be required depending on what voltage the generator makes. Transformer 80 may convert the input voltage to the required voltage to run the rest of the equipment. The transformer or transformers 80 may also convert the three phase power to single phase power. After the transformer the power may travel into a distribution panel 82. The panel 82 may feed power into the rest of the equipment. A contactor panel 84 may be used to switch on and off various mining processor circuits each connected to one or more mining processors 92. Different mining processor circuits

may be designed for different voltages, as some mining processor power supplies run on 120V, and some run on 208V.

[0069] Referring to Fig. 4, the network equipment 88 block may provide a source of internet connection. A satellite / cellular / and/or radio antenna or other network communication equipment 96 may be fitted on the mining device 12 and connected to a modem. The modem may feed a network switch that has ethernet ports. Each mining processor controller may need one ethernet port. The network connection may also feed a controller or controllers 86, which may be a programmable logic controller (PLC), which may be accessed remotely. The controller 86 may be connected to at least a thermistor 90 (temperature sensor) within the mining device 12, to allow the controller 86 to control the ventilation and chilling loads within the enclosure 98. The controller 86 may control the contactor panel 84 switches to open and close circuits to add or remove mining processors 92 from operation. Each mining processor 92 may have a variety of configurations, but generally may include at least a power supply, a controller board and mining circuitry, such as an ASIC circuit. Various mining circuitry examples include CPU (central processing unit), GPU (graphics processing unit), FPGA (Field-Programmable Gate Array), and ASIC (application specific integrated circuit). The components of an ASIC mining processor include the hash boards (each board has numerous chips that is doing the hashing), a controller (to communicate with the network and optimize the mining processors chip frequency and fans for cooling), and a power supply (typically converts AC input power to DC power for the ASIC). Each mining processor 92 may be positioned on racks or shelving units.

[0070] Referring to Fig. 4, the blockchain mining device 12 may comprise a controller 86 connected to operate one or more aspects of the blockchain mining device 12. The controller 86 may be connected to operate a cooling system, for example having a ventilation fan 76 and a chiller 78, to maintain the mining processor 92 within a predetermined operating range of temperature. For example, if the internal temperature within the mining device 12 spikes above a predetermined maximum predetermined temperature, the air ventilation system may initiate or ramp up, and if the temperature contains past a second, relatively higher maximum predetermined temperature, the chilling unit may initiate or ramp up to achieve an air-conditioning effect. Similarly, if the temperature drops below a minimum predetermined temperature, a heating system (not shown) may initiate that may or may not leverage the air ventilation infrastructure to distribute heat. Plural controllers may be incorporated, for example to carry out different tasks, for example one controller for temperature control and another for mining processor control. The enclosure 98 may be structured to insulate its contents from the elements. The enclosure 98 may have a back-up heating device such as a space heater (not shown), for example to be used to heat the enclosure 98 in case of shut down in cold weather.

[0071] Referring to Fig. 4, one or more controllers 86 may modulate operating power loading to operate within the varying and gradually diminishing gas supply levels provided by a remote oil well or other hydrocarbon production, storage, or processing facility. The controller 86 may be connected to modulate a power load level used by the blockchain mining device 12, for example by increasing or decreasing the mining activity, or hashrate, of the mining processor 92. The mining processor 92 may comprise a plurality of processors, and the controller 86 may be connected to modulate the operating power loading level by increasing or decreasing the number of mining processors 92 that are actively engaged in mining, such as powering down one or more mining processors 92.

[0072] The controller 86 may be connected to modulate the power load level in response to variations in a supply or production rate of natural gas from the source of natural gas, for example a production rate of the well 14. Referring to Fig. 5A, over a relatively short time period, such as a single day, the controller 86 may modulate the power load by modulating the mining activity, or hashrate, of a mining processor 92 to correspond with either or both a) readings from a production rate sensor (not shown), or b) a measured gas production time profile based on recent (for example readings taken over the last week) historical gas production readings taken from the well, such as is shown in Fig. 5A. Thus, as gas production increases, so might the controller 86 increase mining activity, or hashrate, of mining processor 92, thereby drawing more power which results in a larger power load and gas consumption of the engine 56. As gas production decreases as it is known to do in a relatively predictable and cyclical fashion as shown, the mining activity may decrease. Adjustments may be made in real time to maximize the use of the casinghead gas produced and to minimize waste of either electricity generated or excess gas sent to a disposal device.

[0073] Referring to Fig. 5A, in some cases the power load level 152 may be set in relation to a daily minimum production rate 155B of natural gas. A production rate of combustible gas from the remote oil well 14 may vary between a daily minimum production rate 155B and a daily maximum production rate 155A. At least while the production rate is above the daily minimum production rate155B, or for a period of time of eight, twelve, twenty-four, or more hours, the controller 86 may be set to limit the power load level to at or below a power level 152 producible by the generator 28 when the production rate is at the daily minimum production rate. Thus, because the power load level is set to the minimum daily power supply from the generator 28, the controller 86 may retain a stable and consistent number of mining processors 92 in operation all day long. Venting may be decreased and little control philosophy may be required. Such a method may not completely eliminate waste such as venting however waste is reduced.

[0074] Referring to Fig. 1, while the power load level is set to the daily minimum, the excess gas or electricity may be addressed in a suitable fashion. In the example shown, excess electricity produced by the

generator 28 is diverted to an electricity disposal device, in this case a load bank 32 when the production rate is above the daily minimum production rate 155B. In some cases the controller 86 or another suitable device, may divert excess gas from reaching engine 24, for example to a suitable gas disposal or storage device, such as an atmospheric vent, a flare, or other device. One or more valves, such as an instrumented valve, may be used for such diversion. In some cases excess gas sent to the engine will automatically divert to disposal through the gas tree, as such equipment may already have pressure regulation installed and set such that above a certain pressure excess gas is diverted to vent or flare. The load bank may be controlled to load up the engine so that all power generated in excess of the required amount to power the mine can be dissipated in the load bank as heat. In such a fashion the user can eliminate venting altogether as long as the engine is sized to consume the maximum available gas supply.

[0075] Referring to Fig. 5A, in some cases the power load level may be set in relation to a daily maximum production rate 155A of natural gas, with shortfall made up by a backup source of fuel or electricity. Referring to Fig. 1, the controller 86 may be set to limit the power load level 150 to above a power level producible by the generator 28 when the production rate 155 is at the daily minimum production rate 155B. In some cases the power level is set to be limited at least while the production rate 155 is above the daily minimum production rate 155B, or for another suitable time period such as eight, twelve, twenty-four or longer periods of time. The power load level may be set to at, below, or above the maximum power level producible by the generator 28 when the production rate 155 is at the daily maximum production rate 155A. A backup source, of fuel or electricity, in this case one or more of propane tanks 30A, 30B, underground fuel supply line 46, and gas outlet line 42 from production storage tank 34, may be connected make up shortfalls in fuel or electricity, respectively, required to supply the blockchain mining device 12 with the power load level. In such an example vented gas is eliminated but back-up fuel use may be increased, thus operating costs may rise relative to the daily low embodiment (embodiments where power load level is set in relation to the daily minimum production rate 155B in Fig. 5A) because of the requirement for the backup fuel or electricity source.

[0076] On a well site there may be one or more uses for produced gas, and thus the production rate of the well may be higher than the production rate of gas that arrives at the engine 24 or 56, however, due to the varying production rate, the fluctuation in the graph gives an indication of the proportional fluctuation in the actual production rate received by the engine 24 or 56 as the case may be. In some cases the engine 24 or 56 is undersized and cannot consume the maximum available gas, in which case the gas is sent to a gas disposal or storage device via pressure regulation in the gas tree and/or at the engine. The engine may comprise a throttle that permits some variation in gas consumption and power production at the engine level,

and in some cases the controller 86 is set to operate the throttle. In some cases the power load level may be set in between the daily maximum and minimum production rates, with a backup energy or fuel source and a method of disposing or storing of excess gas.

[0077] Referring to Fig. 5B, the graph shows a typical scenario where gas production decreases over time. As the natural gas production rate 155 decreases, individual mining processors 92A-E may be removed or disengaged from the device 12 so that the load on the engine 24 or 56 is reduced correspondingly, thereby reducing the required natural gas consumption of the engine 24 or 56 to match or correspond with the decline in gas availability. Fig. 5B depicts an engine fuel consumption level 154 that is modulated over time in a stepped or stepdown fashion in relation to the gradually decreasing production rate 155 of the well.

[0078] In the claims, the word "comprising" is used in its inclusive sense and does not exclude other elements being present. The indefinite articles "a" and "an" before a claim feature do not exclude more than one of the feature being present. Each one of the individual features described here may be used in one or more embodiments and is not, by virtue only of being described here, to be construed as essential to all embodiments as defined by the claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A system comprising:
a source of combustible gas produced from an oil production, storage, or processing facility;
a generator connected to the source of combustible gas; and
a blockchain mining device connected to the generator.

2. The system of claim 1 isolated from a sales gas line and an external electrical power grid.

3. The system of any one of claim 1 - 2 in which:
the oil production, storage, or processing facility comprises a remote oil well;
the source of combustible gas comprises the remote oil well; and
the remote oil well is connected to produce a continuous flow of combustible gas to power the generator.

4. The system of claim 3 further comprising a combustion engine connected to the source of combustible gas and connected to drive the generator.

5. The system of claim 4 in which the combustion engine is a prime mover that is connected to produce oil from the remote oil well.

6. The system of claim 4 in which the combustion engine is a first combustion engine, and further comprising a second combustion engine that is a prime mover that is connected to produce oil from the remote oil well.

7. The system of any one of claim 1 - 6 in which:
the oil production, storage, or processing facility comprise an oil storage or processing unit;
the source of combustible gas comprises the oil storage or processing unit, which has a gas outlet connected to supply combustible gas to operate the generator; and
the oil storage or processing unit is connected to receive oil produced from a remote oil well.

8. The system of any one of claim 1 - 7 in which the generator and blockchain mining device are located adjacent to the oil production, storage, or processing facility.

9. The system of any one of claim 1 - 8 in which the oil production, storage, or processing facility comprises a remote oil well, which comprises a plurality of remote oil wells, and one or both of the following conditions are satisfied:

the plurality of remote oil wells are located on a multi-well pad; or

the plurality of remote oil wells include a satellite well.

10. The system of any one of claim 1 - 9 in which:

the blockchain mining device has a network interface and a mining processor;

the network interface is connected to receive and transmit data through the internet to a network that stores or has access to a blockchain database; and

the mining processor is connected to the network interface and adapted to mine transactions associated with the blockchain database and to communicate with the blockchain database.

11. The system of claim 10 in which:

the network is a peer to peer network;

the blockchain database is a distributed database stored on plural nodes in the peer to peer network; and

the blockchain database stores transactional information for a digital currency.

12. The system of any one of claim 10 - 11 in which a controller is connected to modulate a power load level exerted by the blockchain mining device on the generator, by increasing or decreasing the mining activity of the mining processor.

13. The system of claim 12 in which:

the mining processor comprises a plurality of mining processors; and

the controller is connected to modulate the maximum power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining transactions.

14. The system of claim 13 in which:

the oil production, storage, or processing facility comprises a remote oil well;

the source of combustible gas comprises the remote oil well, which is connected to produce a continuous flow of combustible gas to operate the generator.

15. The system of claim 14 in which the controller is connected to modulate the power load level in response to variations in a production rate of combustible gas from the remote oil well.

16. The system of any one of claim 14 - 15 in which:

a production rate of combustible gas from the remote oil well varies between a daily minimum production rate and a daily maximum production rate; and

while the production rate is above the daily minimum production rate, the controller is set to limit the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate.

17. The system of claim 16 in which the controller is set to divert to a load bank excess electricity produced by the generator.

18. The system of any one of claim 14 - 15 in which:

a production rate of combustible gas from the remote oil well varies between a daily minimum production rate and a daily maximum production rate;

the controller is set to limit the power load level to above a power level producible by the generator when the production rate is at the daily minimum production rate; and

a backup source, of fuel or electricity, is connected make up a shortfall in fuel or electricity, respectively, required to supply the blockchain mining device with the power load level.

19. The system of any one of claim 1 - 18 in which a controller is connected to operate a cooling system to maintain the blockchain mining device within a predetermined operating range of temperature.

20. The system of any one of claim 1 - 19 in which the blockchain mining device is mounted on a skid or trailer.

21. The system of claim 20 in which the skid or trailer comprises a generator driven by an engine, which is connected to the source of combustible gas.

22. The system of any claim 21 in which the engine comprises a turbine.

23. The system of any one of claim 1 - 22 in which the blockchain mining device comprises an intermodal transport container.

24. A method comprising using a source of combustible gas produced at a hydrocarbon production well, storage, or processing facility, to produce electricity to operate a blockchain mining device located at the hydrocarbon production well, storage, or processing facility, respectively.

25. The method of claim 24 further comprising, prior to using the source of combustible gas:

disconnecting the source of combustible gas from a combustible gas disposal device at the hydrocarbon production well, storage, or processing facility; and

connecting the source of combustible gas to operate the blockchain mining device.

26. The method of any one of claim 24 - 25 further comprising:

connecting the source of combustible gas to operate the blockchain mining device; and

diverting gas from a combustible gas disposal or storage device to operate the blockchain mining device.

27. The method of any one of claim 25 – 26 in which the combustible gas disposal or storage device comprises one or more of a flare, a vent to the atmosphere, an incinerator, or a burner.

28. The method of any one of claim 24 - 27 in which the hydrocarbon production well, storage, or processing facility comprises an oil or gas well that is isolated from a sales gas line and an external electrical power grid.

29. The method of any one of claim 24 - 28 in which the source of combustible gas is a remote oil or gas well, and further comprising producing a continuous flow of combustible gas to power a generator connected to operate the blockchain mining device.

30. The method of claim 29 in which producing further comprises supplying combustible gas to a combustion engine that is connected to drive the generator.

31. The method of claim 30 in which the source of combustible gas is a remote oil well, and further comprising using the combustion engine as a prime mover to produce oil from the remote oil well.

32. The method of claim 31 in which, prior to using the source of combustible gas, the combustion engine is under loaded as the prime mover, and further comprising connecting the generator to a power takeoff connected to the combustion engine.

33. The method of claim 30 in which the combustion engine is a first combustion engine, and further comprising:

prior to supplying combustible gas to the first combustion engine, connecting the first combustion engine to receive combustible gas from the remote oil well; and

using a second combustion engine as a prime mover to produce oil from the remote oil well.

34. The method of any one of claim 29 - 33 further comprising operating the blockchain mining device to:

mine transactions with the blockchain mining device; and

communicate wirelessly through the internet to communicate with a blockchain database.

35. The method of claim 34 further comprising modulating, using a controller, a power load level exerted by the blockchain mining device on the generator, by increasing or decreasing a mining activity of the blockchain mining device.

36. The method of claim 35 in which:

the blockchain mining device comprises a plurality of mining processors; and

modulating comprises modulating the power load level by increasing or decreasing a maximum number of mining processors that are engaged in mining transactions.

37. The method of claim 36 in which modulating comprises modulating the power load level in response to variations in a production rate of combustible gas from the remote oil or gas well.

38. The method of any one of claim 36 - 37 in which:

a production rate of combustible gas from the remote oil or gas well varies between a daily minimum production rate and a daily maximum production rate; and

modulating comprises limiting, while the production rate is above the daily minimum production rate, the power load level to at or below a power level producible by the generator when the production rate is at the daily minimum production rate.

39. The method of claim 38 further comprising diverting to a load bank excess electricity produced by the generator.

40. The method of any one of claim 36 - 37 in which:

a production rate of combustible gas from the remote oil or gas well varies between a daily minimum production rate and a daily maximum production rate;

modulating comprises limiting the power load level to above a power level produced by the generator when the production rate is at the daily minimum production rate; and

supplying from a backup fuel or electricity source a shortfall in fuel or electricity, respectively, required to supply the blockchain mining device with the power load level.

41. The method of claim 40 in which the power load level is limited to above a power level produced by the generator when the production rate is at the daily maximum production rate.

ABSTRACT OF THE DISCLOSURE

Methods and systems of operating a blockchain mining device using natural gas produced at a hydrocarbon production, storage, or processing site/facility. A generator may be retrofitted to an existing prime mover used to pump the well, and the generator may be used to power the blockchain mining device. Portable mining devices may be hooked up to a casinghead gas supply at a remote, isolated oil facility. Power loading levels may be modulated by adjusting mining transaction levels to correspond with combustible gas production levels.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	BLOCKCHAIN MINE AT OIL OR GAS FACILITY
First Named Inventor/Applicant Name:	Stephen Barbour
Filer:	Robert Anton Nissen
Attorney Docket Number:	91A-3US

Filed as Small Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
BASIC NATIONAL STAGE FEE	2631	1	150	150
NATL STAGE SEARCH FEE - ALL OTHER CASES	2632	1	330	330
NATL STAGE EXAM FEE - ALL OTHER CASES	2633	1	380	380
Pages:				
Claims:				
Miscellaneous-Filing:				
OATH/DECL > 30 MOS FROM 371 COMMENCEMENT	2617	1	70	70
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	930

Electronic Acknowledgement Receipt	
EFS ID:	36825333
Application Number:	16484728
International Application Number:	PCT/CA2018/050135
Confirmation Number:	1944
Title of Invention:	BLOCKCHAIN MINE AT OIL OR GAS FACILITY
First Named Inventor/Applicant Name:	Stephen Barbour
Customer Number:	130443
Filer:	Robert Anton Nissen
Filer Authorized By:	
Attorney Docket Number:	91A-3US
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	WebADS.pdf	116921 0950777a9ee9ca5e23a5db975481e9ae89d5d153	no	7
Warnings:					
Information:					
2	Drawings-only black and white line drawings	91-3PCT_drawings.pdf	1130392 fb2ffd7631ab4f6e3c3dba027452a2aa11a16d19	no	6
Warnings:					
Information:					
3		patent_application_updated.pdf	196352 ef15c6e2588bc0bf6301dbeb8532756bcad5c02f	yes	30

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Specification	1	23
	Claims	24	29
	Abstract	30	30

Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	36817 723cc03f5e59f564b71cbae153d7740267db53d9	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1480482		

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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.