Trilateral Symposium on IP and Environmental Issues

March 17, 2022

By: Steve Katsaros, US Patent Agent

NOKERO® SOLAR | PROJECT CANARY


(1938-2008)
NOKERO
SOLAR


NOKERO
SOLAR

KEROSENE

1.2 billion people

5 gigatons CO_2 *

$30 billion per year

* 20-year equivalent

NOKERO® SOLAR

NOKERO® SOLAR

SOLAR LIGHT BULB

NOKERO SOLAR

charge

=

15 hours of light

5 years

NOKERO
SOLAR


NOKERO
SOLAR

HOPE & SECURITY

NOKERO SOLAR

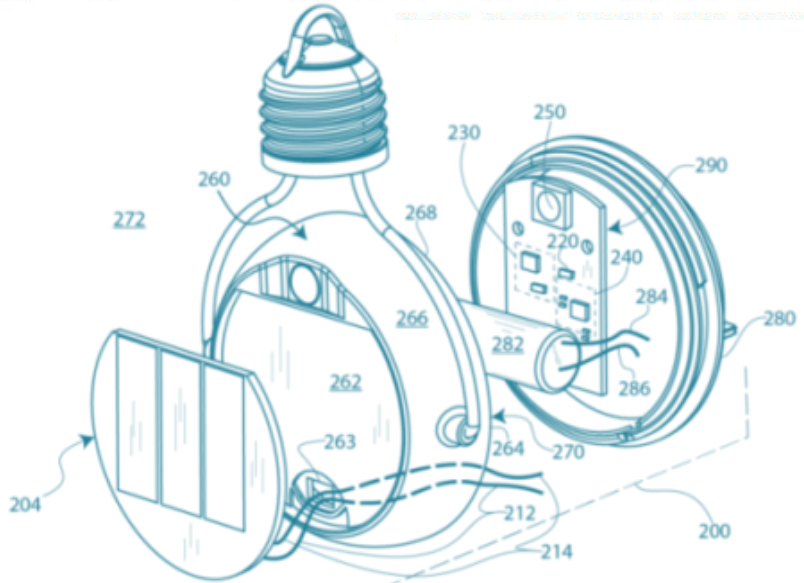

2,000,000 lights
120 countries
10m people
1.2 Billion
NOKERO
SOLAR


NOKERO
SOLAR

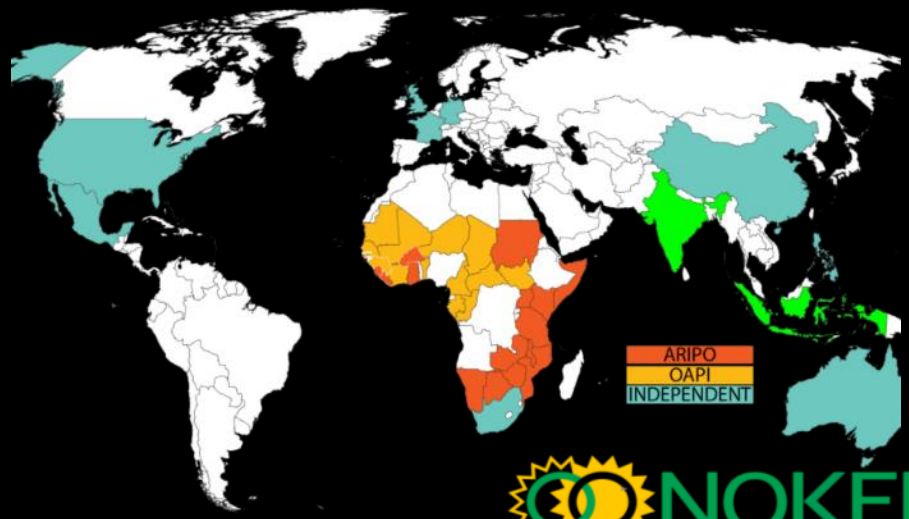
GLOBAL PATENTS

The U.S. Patent and Trademark Office

Patents for Humanity

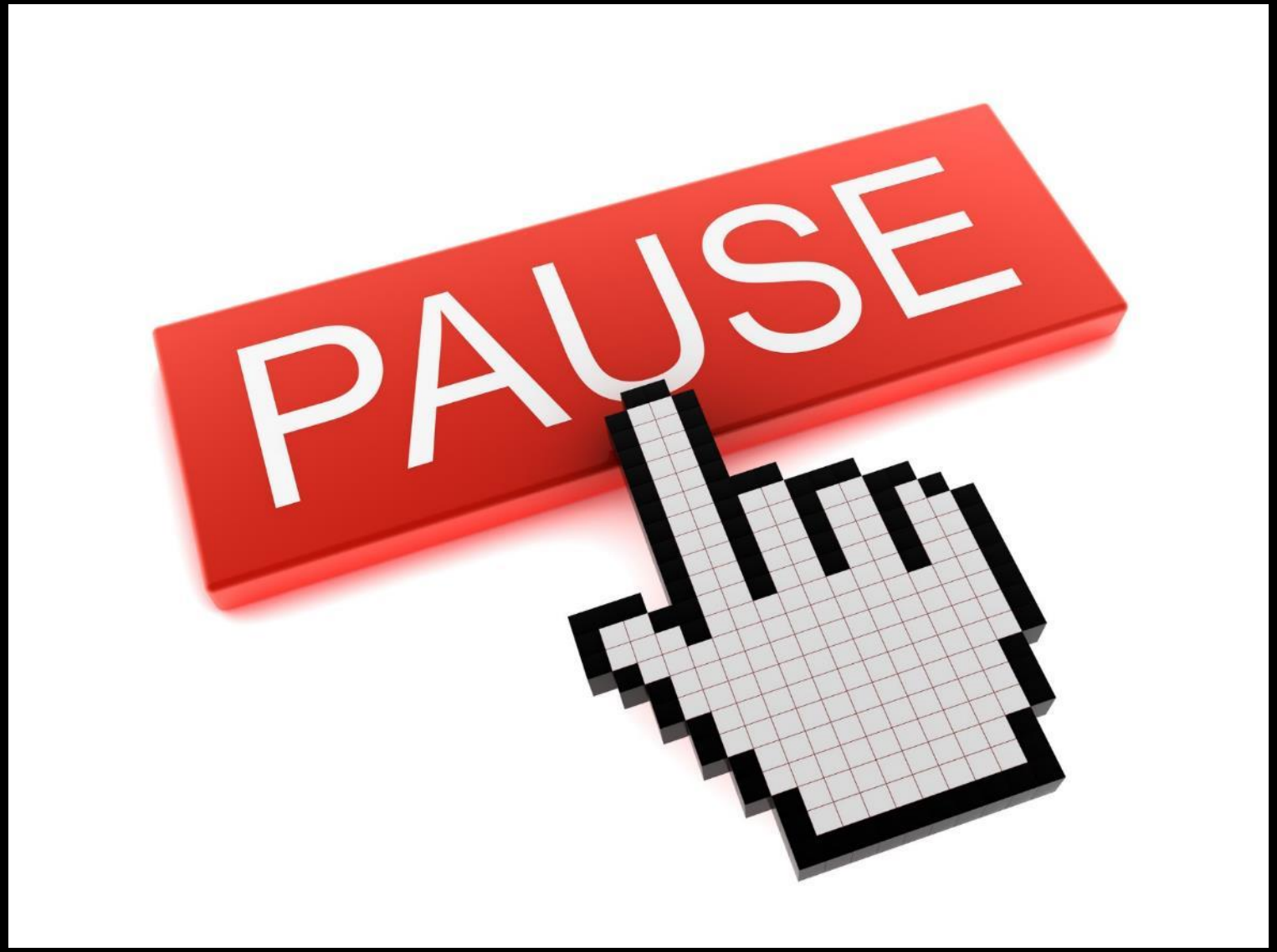


48 COUNTRIES

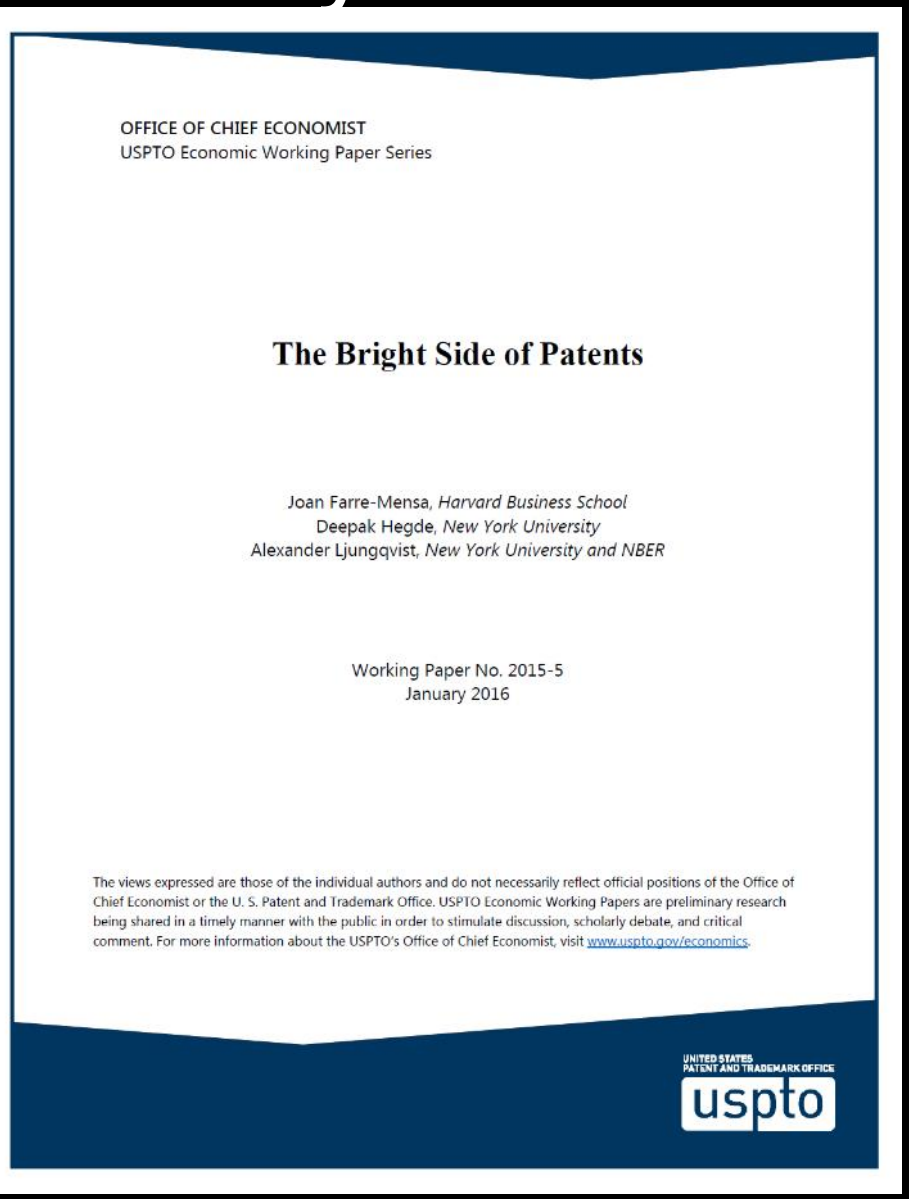


NOKERO SOLAR

IP Strategy


PAUSE

Early Patents Enable Business:



OFFICE OF CHIEF ECONOMIST
USPTO Economic Working Paper Series

The Bright Side of Patents

Joan Farre-Mensa, *Harvard Business School*
Deepak Hegde, *New York University*
Alexander Ljungqvist, *New York University and NBER*

Working Paper No. 2015-5
January 2016

UNITED STATES PATENT AND TRADEMARK OFFICE
uspto

(45,817 Patents Show)

Employees: +36%
(first 5-years)

Revenue: +51%

IPO: +100%

VC Investment +53%
(within first 3-years)

PROJECT CANARY

- Goal to reverse climate change through measurement and reporting of emissions
- Focused on methane emissions detection and reduction, freshwater use, and community impacts for energy-intensive industries
  - Real-time reporting and quantification to cause change

AIR QUALITY MEASUREMENT UNIT

Canary Unit

Modular & affordable, can use 12+ pollutant sensors, cellular connection, 6+ days of backup battery power, 1 year of data storage

Summa Canister

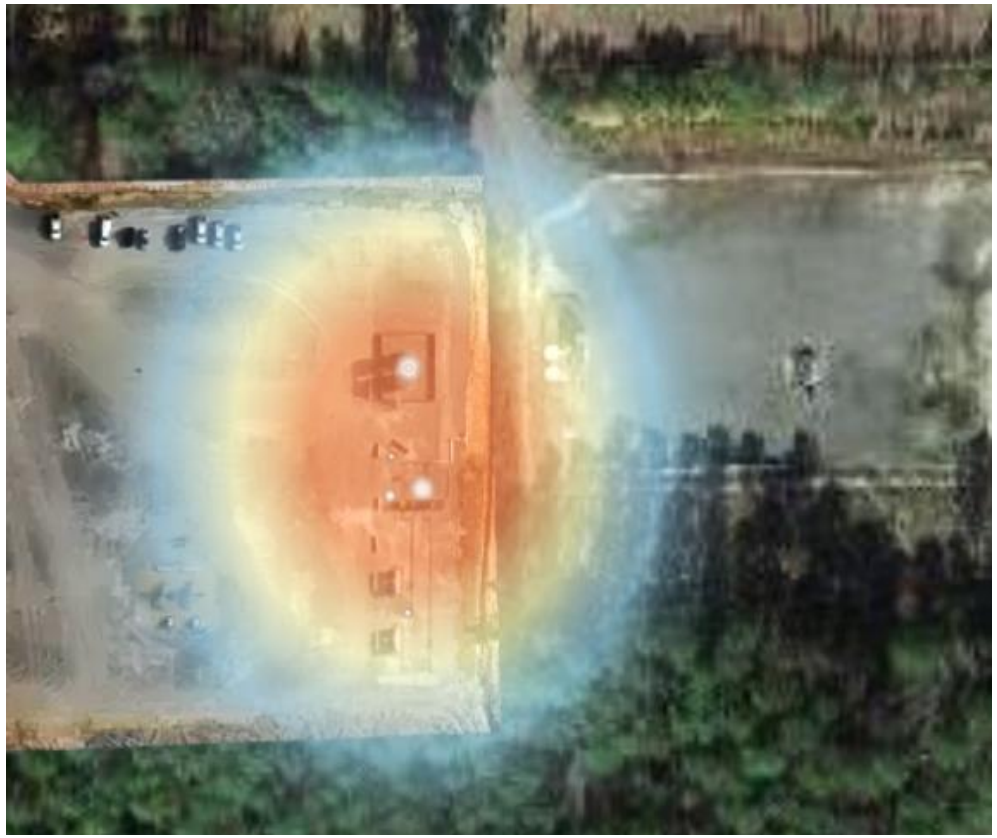
Patented approach to automated “grab” air samples. Allows for parts per trillion clarity about a plume’s composition

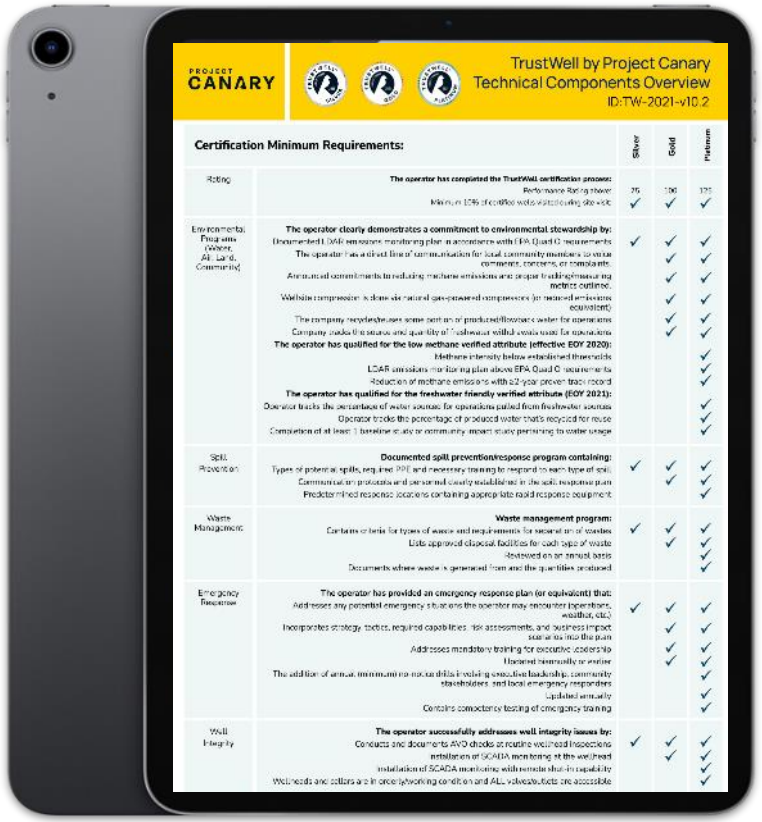
Anemometer

Precise wind speed & direction. Key to mass quantification and source attribution

Solar Power

20W – 30W solar panels




PROJECT CANARY
TrustWell by Project Canary
Technical Components Overview
ID:TW-2021-v10.2
Certification Minimum Requirements:
Silver
Gold
Platinum


HEATMAP
SOURCES

Connecting the Certified Energy Value Chain

01

Deploy Sensors at Each Well or Pipeline Facility

- Continuous Monitoring
- Actionable analysis and operational notifications

02

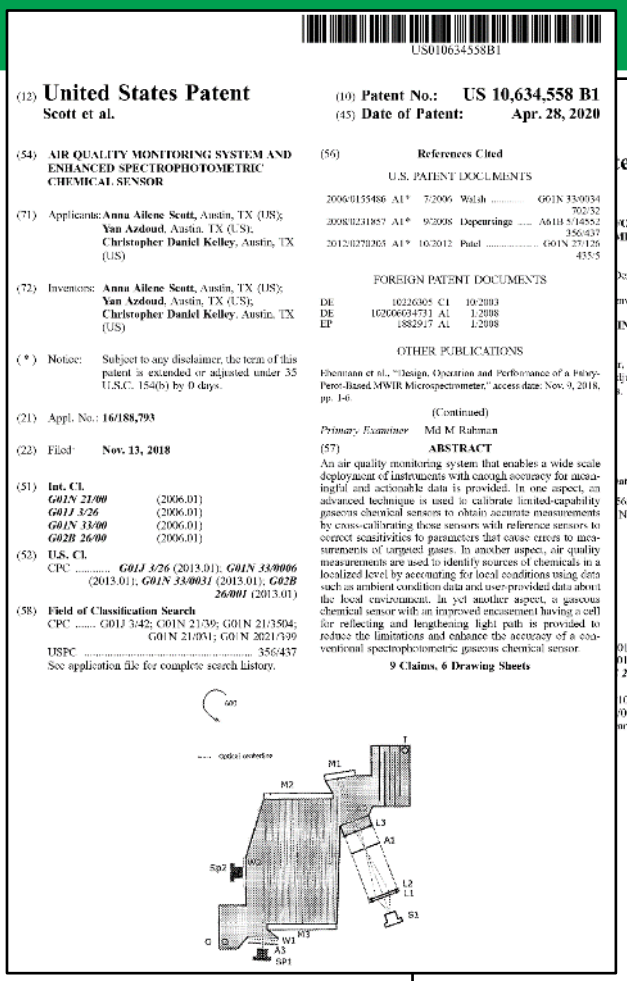
Perform Environmental Assessments of Every Asset

- Review all environmental risks and risk-mitigation efforts
- Market differentiation and certified assets

03

Issue Canary Certifications (Physical & Registries)

- Ongoing monitoring and assessment support
- Provide in-house support to develop ESG initiatives



US010634558B1

(12) **United States Patent**
Scott et al.

(10) **Patent No.: US 10,634,558 B1**
(45) **Date of Patent: Apr. 28, 2020**

(54) **AIR QUALITY MONITORING SYSTEM AND ENHANCED SPECTROPHOTOMETRIC CHEMICAL SENSOR**

(71) Applicants: **Annu Ailene Scott**, Austin, TX (US); **Yan Azdoud**, Austin, TX (US); **Christopher Daniel Kelley**, Austin, TX (US)

(72) Inventors: **Annu Ailene Scott**, Austin, TX (US); **Yan Azdoud**, Austin, TX (US); **Christopher Daniel Kelley**, Austin, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/188,793**

(22) Filed: **Nov. 13, 2018**

(51) **Int. Cl.**
G01N 21/00 (2006.01)
G01J 3/26 (2006.01)
G01N 33/00 (2006.01)
G02B 26/00 (2006.01)

(52) **U.S. Cl.**
CPC ***G01J 3/26*** (2013.01); ***G01N 33/0006*** (2013.01); ***G01N 33/0031*** (2013.01); ***G02B 26/001*** (2013.01)

(58) **Field of Classification Search**
CPC G01J 3/42; G01N 21/39; G01N 21/3504; G01N 21/031; G01N 2021/399
USPC 356/437
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2006/0155486 A1* 7/2006 Walsh G01N 33/0034 702/32
2008/0231857 A1* 9/2008 Depenringe A61B 5/14552 356/437
2012/0278265 A1* 10/2012 Patel G01N 27/126 435/5

FOREIGN PATENT DOCUMENTS

DE 102226305 C1 10/2003
DE 102006034731 A1 1/2008
EP 1882917 A1 1/2008

OTHER PUBLICATIONS

Ehrenmann et al., "Design, Operation and Performance of a Fabry-Perot-Based MWIR Microspectrometer," access date: Nov. 9, 2018, pp. 1-6.

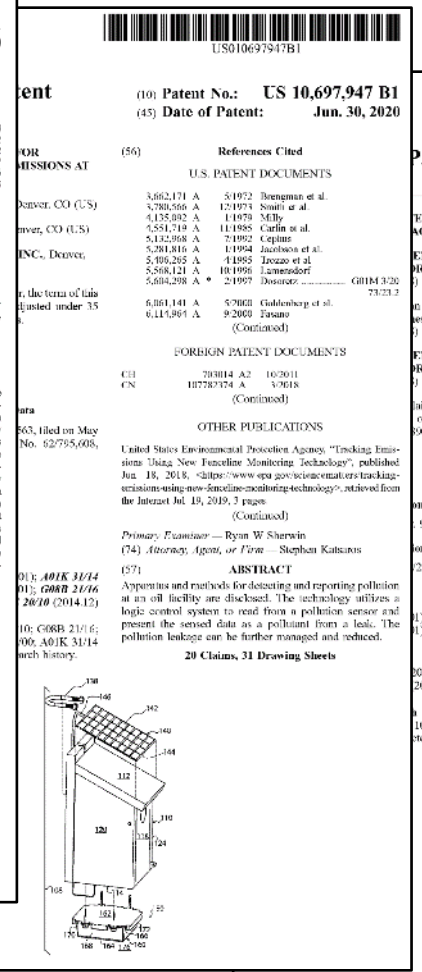
(Continued)

Primary Examiner — Md M Rahman

(57) **ABSTRACT**

An air quality monitoring system that enables a wide scale deployment of instruments with enough accuracy for meaningful and actionable data is provided. In one aspect, an advanced technique is used to calibrate limited-capability gaseous chemical sensors to obtain accurate measurements by cross-calibrating those sensors with reference sensors to correct sensitivities to parameters that cause errors to measurements of targeted gases. In another aspect, air quality measurements are used to identify sources of chemicals in a localized level by accounting for local conditions using data such as ambient condition data and user-provided data about the local environment. In yet another aspect, a gaseous chemical sensor with an improved encasement having a cell for reflecting and lengthening light path is provided to reduce the limitations and enhance the accuracy of a conventional spectrophotometric gaseous chemical sensor.

9 Claims, 6 Drawing Sheets



US010697947B1

(10) **Patent No.: US 10,697,947 B1**
(45) **Date of Patent: Jun. 30, 2020**

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,662,171 A 5/1972 Brengman et al.
3,780,566 A 12/1973 Smith et al.
4,135,892 A 1/1979 Melly
4,551,719 A 11/1985 Carlin et al.
5,132,968 A 7/1992 Cephus
5,291,816 A 1/1994 Jacobson et al.
5,406,265 A 4/1995 Trezzo et al.
5,568,121 A 10/1996 Lamensdorf
5,604,298 A * 2/1997 Dosoretz G01M 3/20 73/23.2
6,861,141 A 3/2005 Goldenberg et al.
6,114,961 A 9/2000 Fasano

(Continued)

FOREIGN PATENT DOCUMENTS

CH 703014 A2 10/2011
CN 107787374 A 3/2018

(Continued)

OTHER PUBLICATIONS

United States Environmental Protection Agency, "Tracking Emissions Using New Fenceline Monitoring Technology", published Jun. 18, 2018, <https://www.epa.gov/sciencematters/tracking-emissions-using-new-fenceline-monitoring-technology>, retrieved from the Internet Jul. 19, 2019, 3 pages.

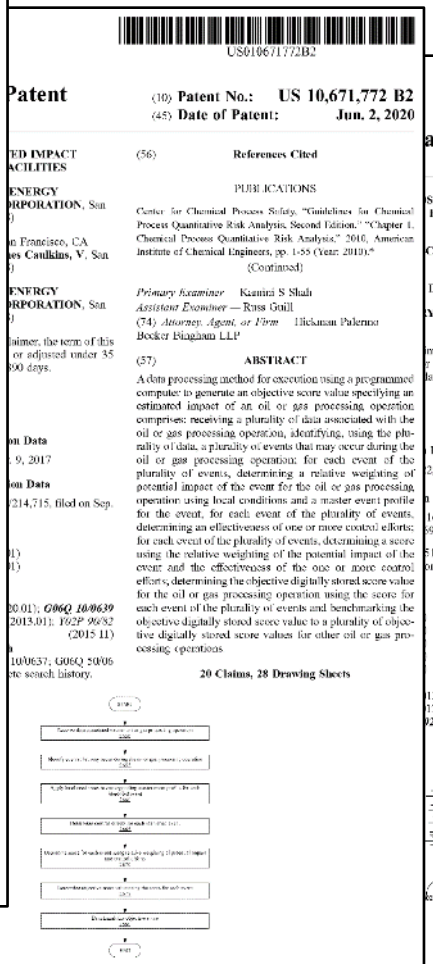
(Continued)

Primary Examiner — Ryan W Sherwin
(74) *Attorney, Agent, or Firm* — Stephen Katsaros

(57) **ABSTRACT**

Apparatus and methods for detecting and reporting pollution at an oil facility are disclosed. The technology utilizes a logic control system to read from a pollution sensor and present the sensed data as a pollutant from a leak. The pollution leakage can be further managed and reduced.

20 Claims, 31 Drawing Sheets



US010671772B2

(10) **Patent No.: US 10,671,772 B2**
(45) **Date of Patent: Jun. 2, 2020**

(56) **References Cited**

PUBLICATIONS

Center for Chemical Process Safety, "Guidelines for Chemical Process Quantitative Risk Analysis, Second Edition," "Chapter 1. Chemical Process Quantitative Risk Analysis," 2010, American Institute of Chemical Engineers, pp. 1-55 (Year: 2010).*

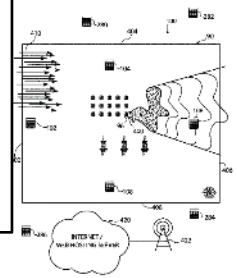
(Continued)

Primary Examiner — Kaamra S Shah
Assistant Examiner — Russ Guill
(74) *Attorney, Agent, or Firm* — Hickman Palermo Becker Bingham LLP

(57) **ABSTRACT**

A data processing method for execution using a programmed computer to generate an objective score value specifying an estimated impact of an oil or gas processing operation comprises: receiving a plurality of data associated with the oil or gas processing operation, identifying, using the plurality of data, a plurality of events that may occur during the oil or gas processing operation; for each event of the plurality of events, determining a relative weighting of potential impact of the event for the oil or gas processing operation using local conditions and a master event profile for the event, for each event of the plurality of events, determining a score using the relative weighting of the potential impact of the event and the effectiveness of the one or more control efforts, determining the objective digitally stored score value for the oil or gas processing operation using the score for each event of the plurality of events and benchmarking the objective digitally stored score value to a plurality of objective digitally stored score values for other oil or gas processing operations

20 Claims, 28 Drawing Sheets



US011215593B2

(10) **Patent No.: US 11,215,593 B2**
(45) **Date of Patent: Jan. 4, 2022**

(58) **Field of Classification Search**
CPC G01N 33/0006; H02S 20/10; H02S 40/30; H02S 20/20; A01K 31/14; F21H 41/00; G08B 21/16; Y02E 10/50
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,662,171 A 5/1972 Brengman et al.
3,780,566 A 12/1973 Smith et al.
4,135,892 A 1/1979 Melly
4,551,719 A 11/1985 Carlin et al.

(Continued)

FOREIGN PATENT DOCUMENTS

CH 703014 A2 10/2011
CN 107787374 A 3/2018

(Continued)

OTHER PUBLICATIONS

Collier-Oxandale, et al., "Understanding the ability of low-cost MOx sensors to quantify ambient VOCs", Atmospheric Measurement Techniques, Mar. 5, 2019, pp. 1441-1460, vol. 12, Copernicus Publications on behalf of the European Geosciences Union, 20 pages.

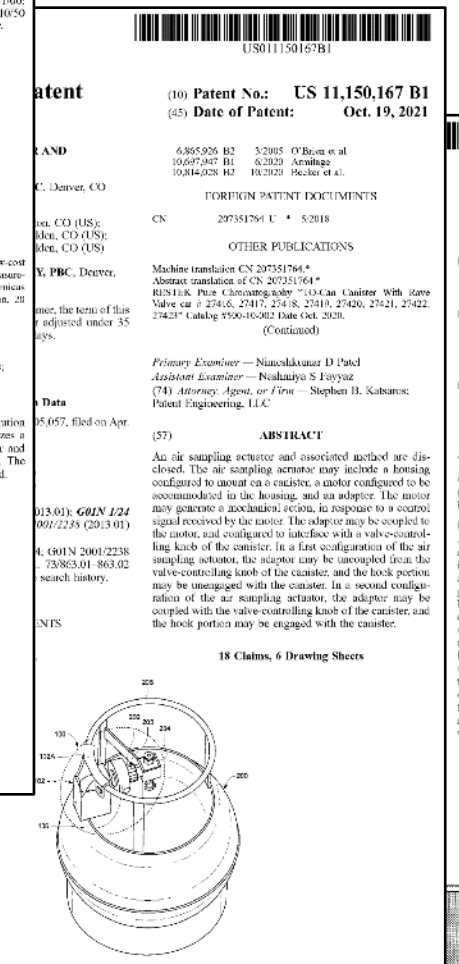
(Continued)

Primary Examiner — Ryan W Sherwin
(74) *Attorney, Agent, or Firm* — Stephen B. Katsaros; Patent Engineering, LLC

(57) **ABSTRACT**

Apparatus and methods for detecting and reporting pollution at an oil facility are disclosed. The technology utilizes a logic control system to read from a pollution sensor and present the sensed data as a pollutant from a leak. The pollution leakage can be further managed and reduced.

16 Claims, 31 Drawing Sheets



US011150167B1

(10) **Patent No.: US 11,150,167 B1**
(45) **Date of Patent: Oct. 19, 2021**

6,865,926 B2 3/2005 O'Brien et al
10,697,947 B1 6/2020 Armitage
10,814,028 B2 10/2020 Becker et al.

FOREIGN PATENT DOCUMENTS

CN 207351764 U * 5/2018

OTHER PUBLICATIONS

Machine translation CN 207351764,*
Abstract translation of CN 207351764*
RIESTER Pure Chromatography "143-Can Canister With Rave Valve cat # 27418, 27417, 27418, 27419, 27420, 27421, 27422, 27423" Catalog 9500-10-002 Date Oct. 2020.

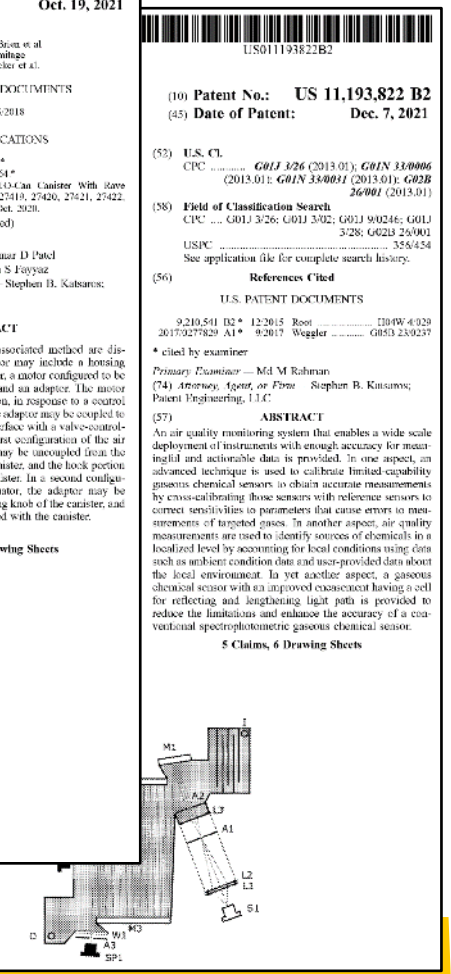
(Continued)

Primary Examiner — Nimeshkumar D Patel
Assistant Examiner — Neahaiya S Fayyaz
(74) *Attorney, Agent, or Firm* — Stephen B. Katsaros; Patent Engineering, LLC

(57) **ABSTRACT**

An air sampling actuator and associated method are disclosed. The air sampling actuator may include a housing configured to mount on a canister, a motor configured to be accommodated in the housing, and an adapter. The motor may generate a mechanical action, in response to a control signal received by the motor. The adapter may be coupled to the motor, and configured to interface with a valve-controlling knob of the canister. In a first configuration of the air sampling actuator, the adaptor may be uncoupled from the valve-controlling knob of the canister, and the hook portion may be unengaged with the canister. In a second configuration of the air sampling actuator, the adaptor may be coupled with the valve-controlling knob of the canister, and the hook portion may be engaged with the canister.

18 Claims, 6 Drawing Sheets



US011193822B2

(10) **Patent No.: US 11,193,822 B2**
(45) **Date of Patent: Dec. 7, 2021**

(52) **U.S. Cl.**
CPC ***G01J 3/26*** (2013.01); ***G01N 33/0006*** (2013.01); ***G01N 33/0031*** (2013.01); ***G02B 26/001*** (2013.01)

(58) **Field of Classification Search**
CPC G01J 3/26; G01J 3/02; G01J 9/0246; G01J 3/28; G02B 26/001
USPC 356/454
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

9,210,541 B2 * 12/2015 Root H04W 4/029
2017/0277829 A1 * 9/2017 Weggler G06F 23/0237

* cited by examiner

Primary Examiner — Md M Rahman
(74) *Attorney, Agent, or Firm* — Stephen B. Katsaros; Patent Engineering, LLC

(57) **ABSTRACT**

An air quality monitoring system that enables a wide scale deployment of instruments with enough accuracy for meaningful and actionable data is provided. In one aspect, an advanced technique is used to calibrate limited-capability gaseous chemical sensors to obtain accurate measurements by cross-calibrating those sensors with reference sensors to correct sensitivities to parameters that cause errors to measurements of targeted gases. In another aspect, air quality measurements are used to identify sources of chemicals in a localized level by accounting for local conditions using data such as ambient condition data and user-provided data about the local environment. In yet another aspect, a gaseous chemical sensor with an improved encasement having a cell for reflecting and lengthening light path is provided to reduce the limitations and enhance the accuracy of a conventional spectrophotometric gaseous chemical sensor.

5 Claims, 6 Drawing Sheets

7 US- Issued
+3 w/ allowed claims
+PCT
+Foreign, etc.

Accelerating IP to Accelerate Change

Nokero

- Founded 12 Years Ago
- Bottom of Economic Pyramid Customers
- Every Shipment Was Hard

- Raised $2.5M Over 6 Years
- Century-Old Problem

Project Canary

- Founded 3 Years Ago
- 3.4 Months to First O/A (TrackOne)
- Data-Driven Art Unit / Examiner
- Strategy, Efficiency, Value

- Last Round, $111M USD
- Urgency

Patent ENGINEERING LLC

Steve@PatentEngineering.com