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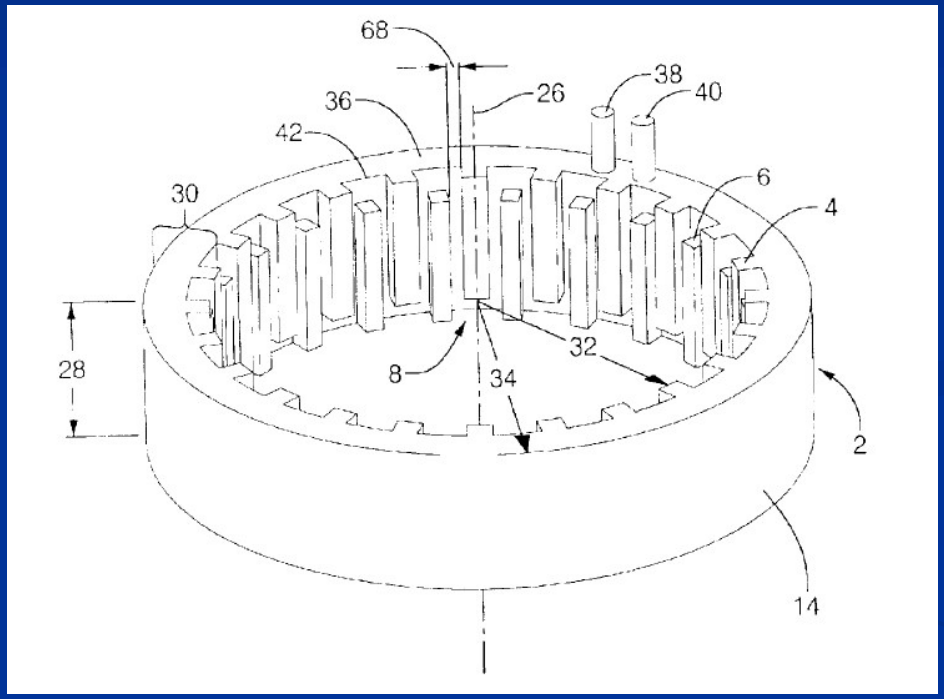

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rsanchez@hsph.harvard.edu

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- **Primaria**: Si se obtiene por interacción directa con el generador de la información (o el cliente) por medio de encuestas, entrevistas y registro de opiniones.
- **Secundaria**: Si se obtiene por medios indirectos relacionados con el mercado del producto o servicio que se desea analizar (censos de población, registros industriales, instituciones académicas y/o gubernamentales, etc.

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  Siempre es conveniente empezar a recolectar la información **secundaria** primero debido a que es más fácil y barata de obtener, siempre y cuando se acuda a las fuentes adecuadas. Ejemplos: Reportes comerciales, catálogos editados por cámaras industriales, estudios bancarios, cámaras de comercio, censos de población, archivos de patentes, revistas y periódicos especializados, etc.

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la información **secundaria** siempre es importante considerar 3 características:

a) Imparcialidad: Es la objetividad de la fuente que proporciona la información, no debe haber ninguna opinión o sesgo social/político.

b) Validez: Es importante la información para lo que estoy estudiando?

c) Confiabilidad: Representa esta muestra el universo de información que quiero estudiar?

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- -Cuestionarios por correo.
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- -Entrevistas telefónicas.
- -Encuestas de opinión por medios remotos (Internet).
- Su uso depende del mercado a donde se dirija:
- Industria → Entrevista.
- Consumidor → Combinación de todas.

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Este motor de búsqueda fue diseñado para listar las paginas mas consultadas en Internet. Sin embargo, muchas veces nos da demasiados resultados y no encontramos lo que buscamos, para reducir este problema utilizamos los operadores de búsqueda.

Allintitle: Nos regresa solamente aquellas paginas que contengan todas las palabras que seleccionemos. Ejemplo: comparar microalgae biofuel VS

allintitle: microalgae biofuel

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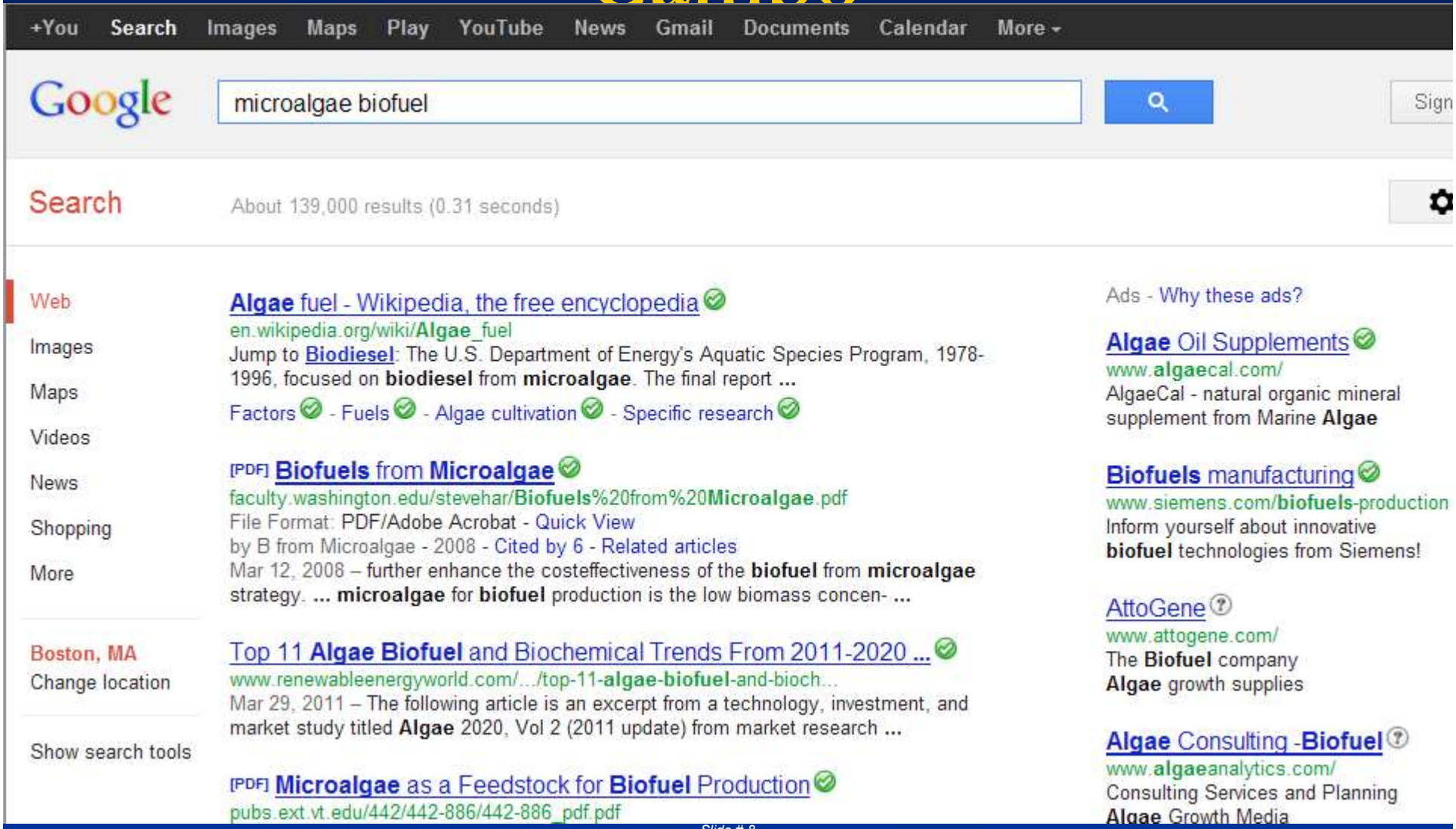

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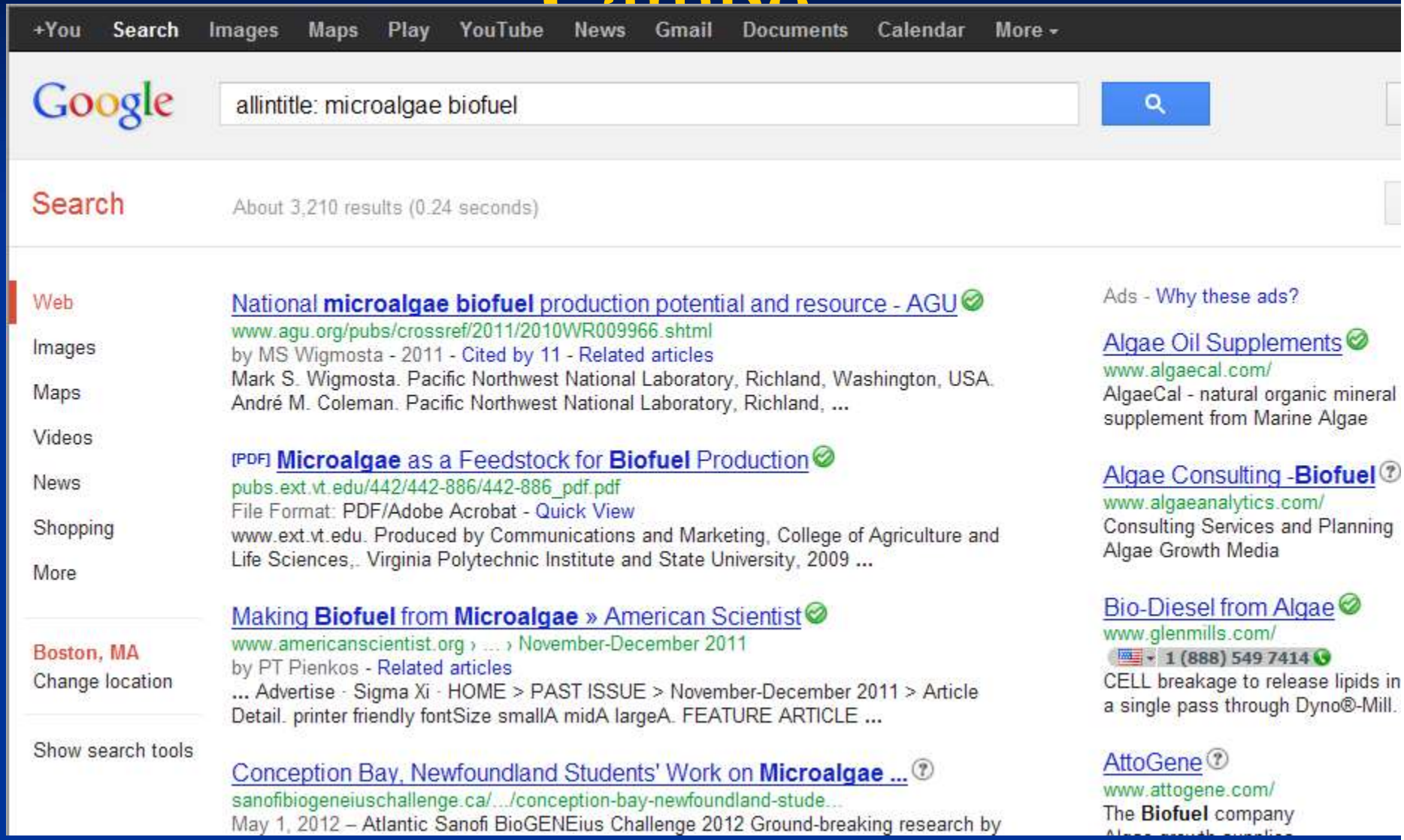

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¿Aun son muchos?

¿Que les parece si usamos mas operadores?

allinurl: Nos da resultados para un dominio en especifico

Por ejemplo, allinurl: gov microalgae , o mejor aun:

allinurl: nrel microalgae

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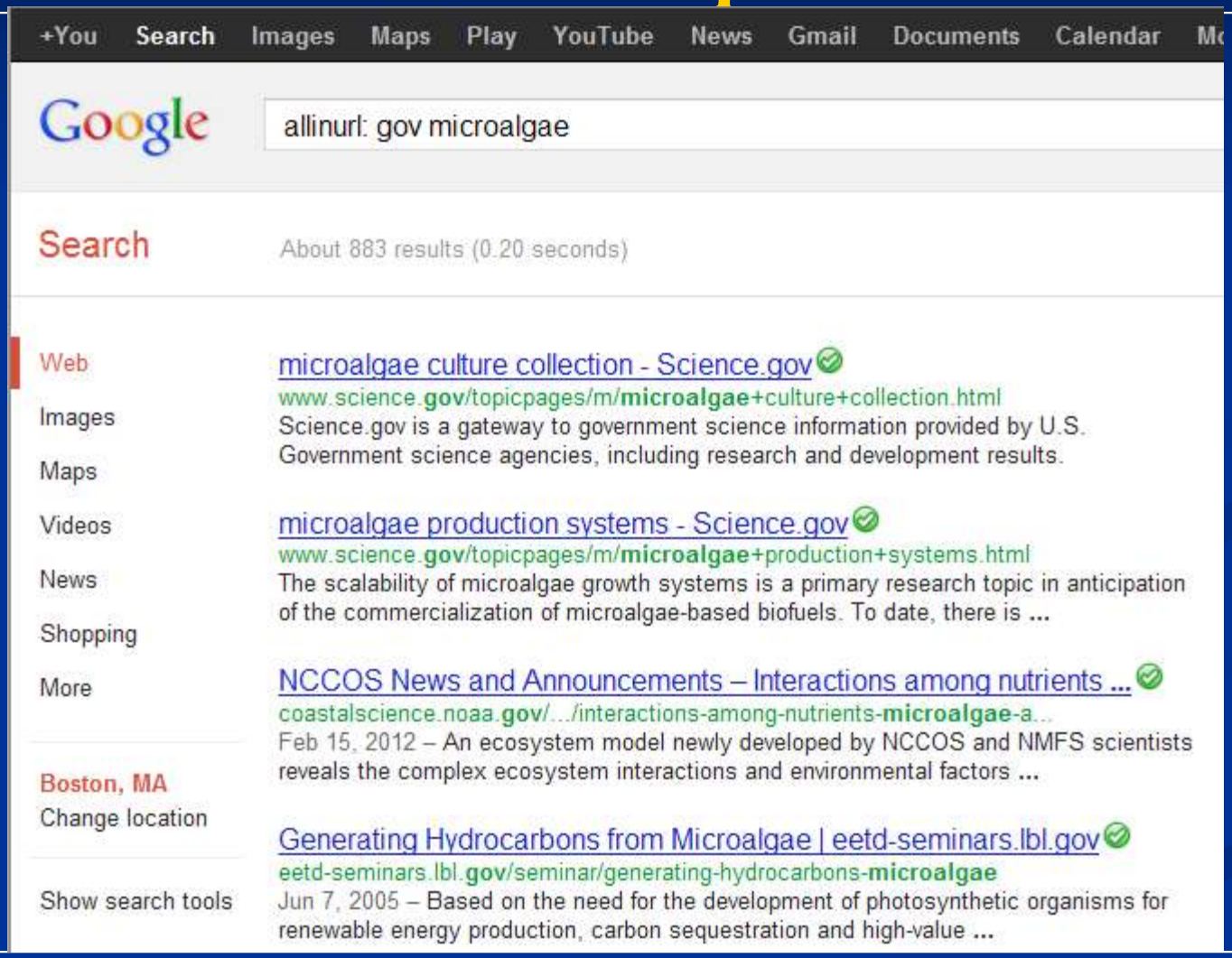

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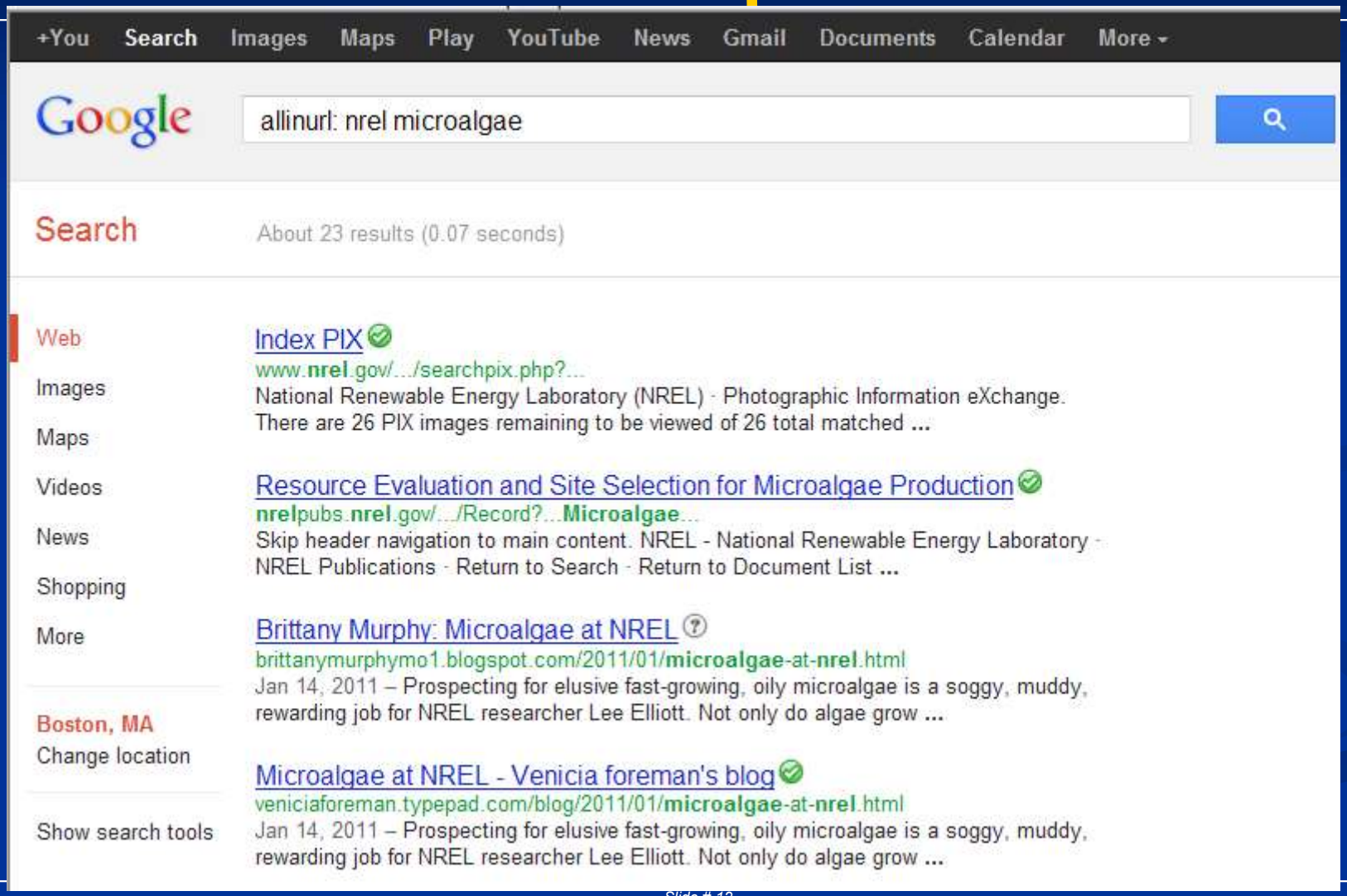

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¿Quieren ser todavía mas específicos?

Usen el operador filetype, así es como se hace:

Microalgae biofuel ramon sanchez filetype:pdf

Microalgae harvesting filetype:ppt

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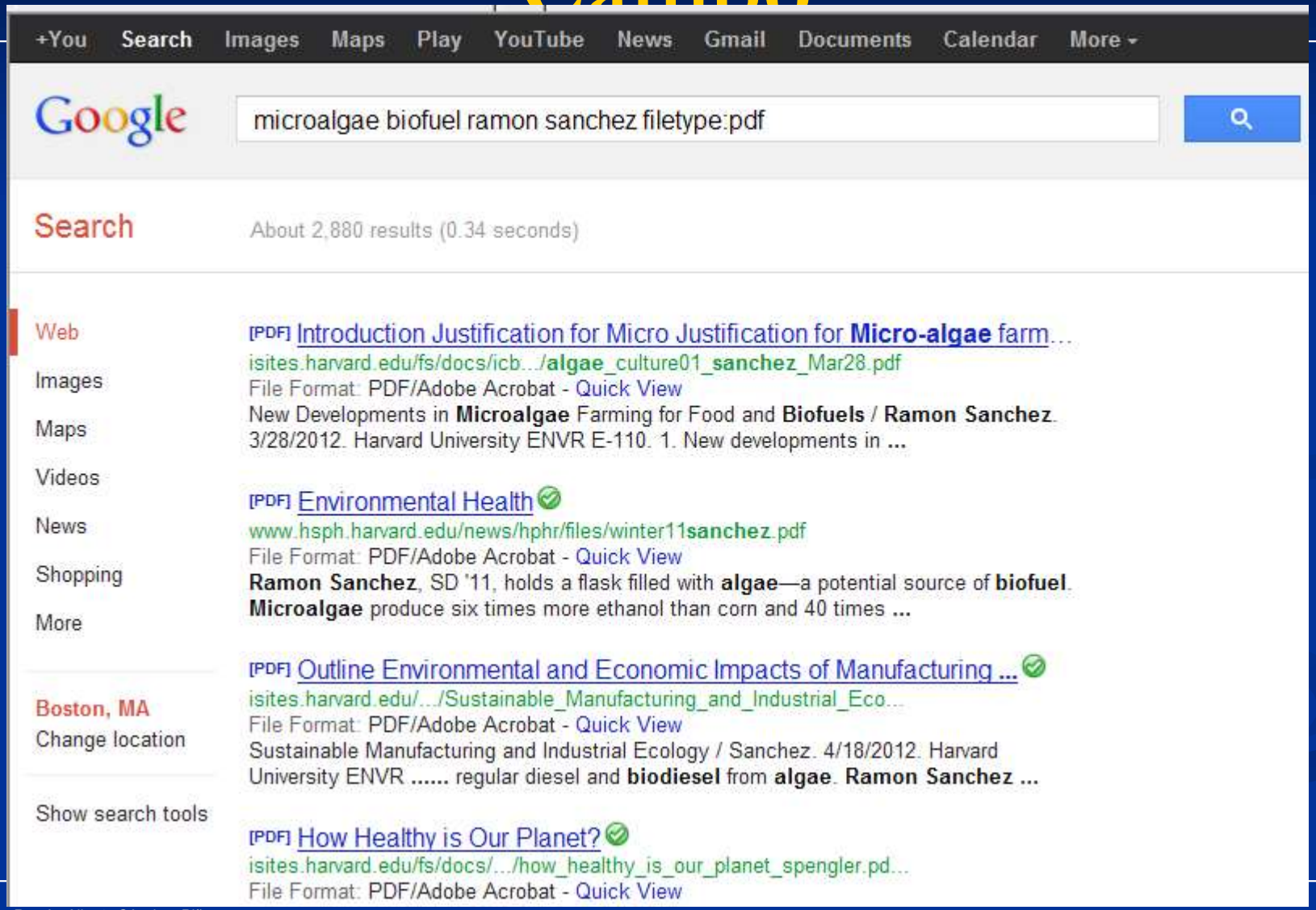

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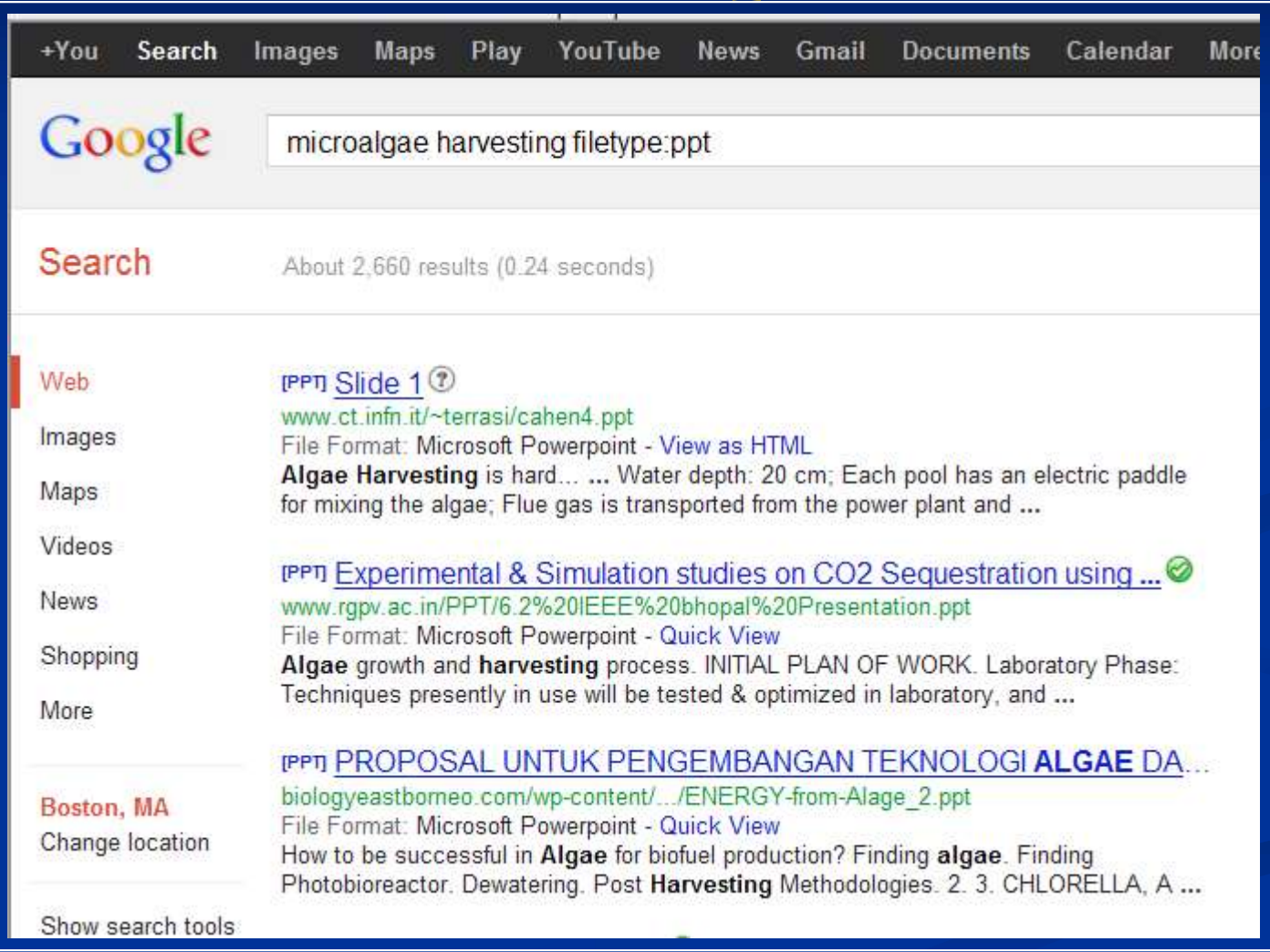

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Otros operadores útiles

"Phonebook" nos busca los teléfonos o datos de contacto de una persona en especifico, por ejemplo

Phonebook: Ramon Sánchez Harvard

"Link" nos indica que paginas refieren a una dirección en Internet en especifico, por ejemplo

Link: www.itesm.mx

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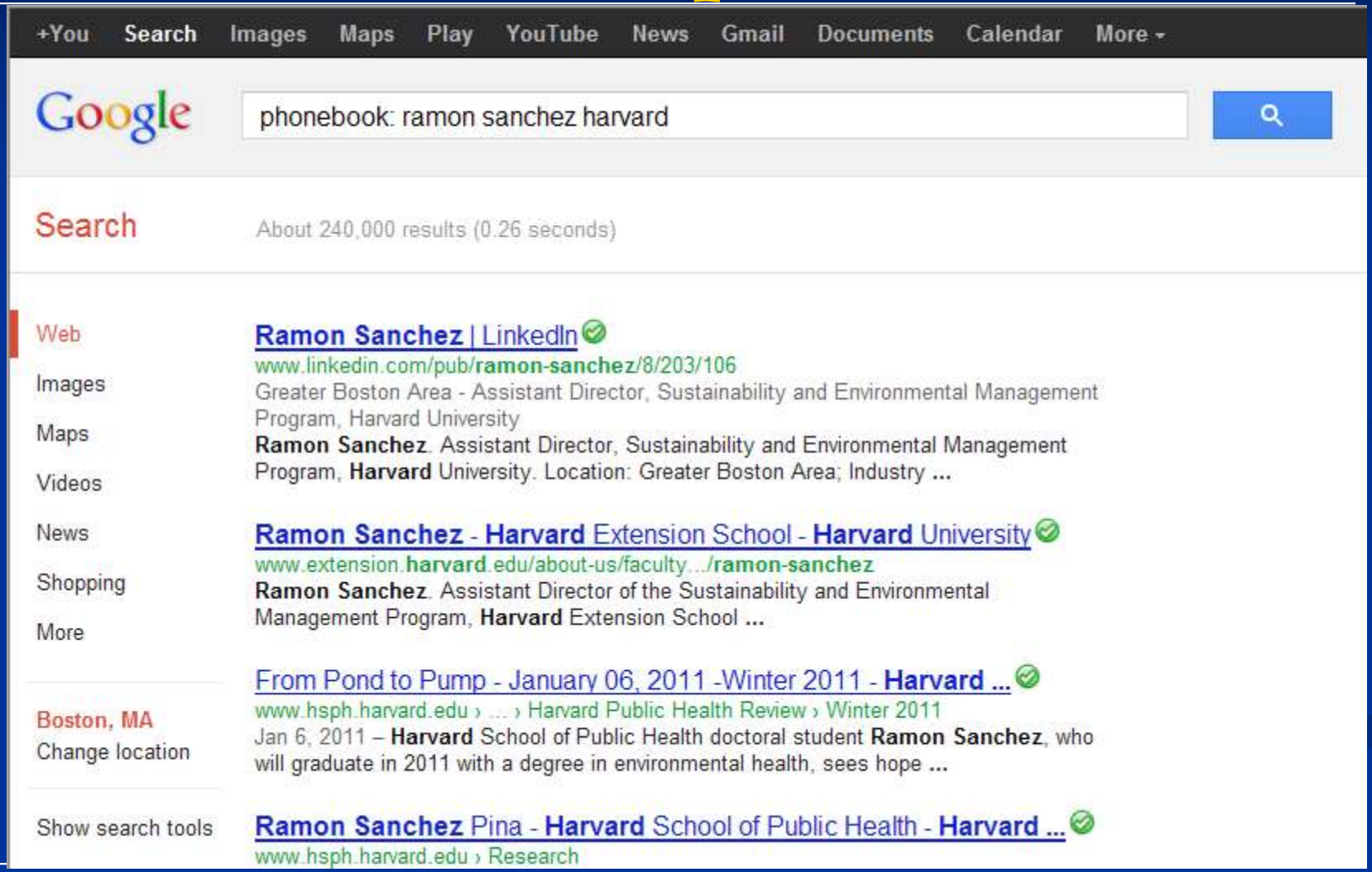

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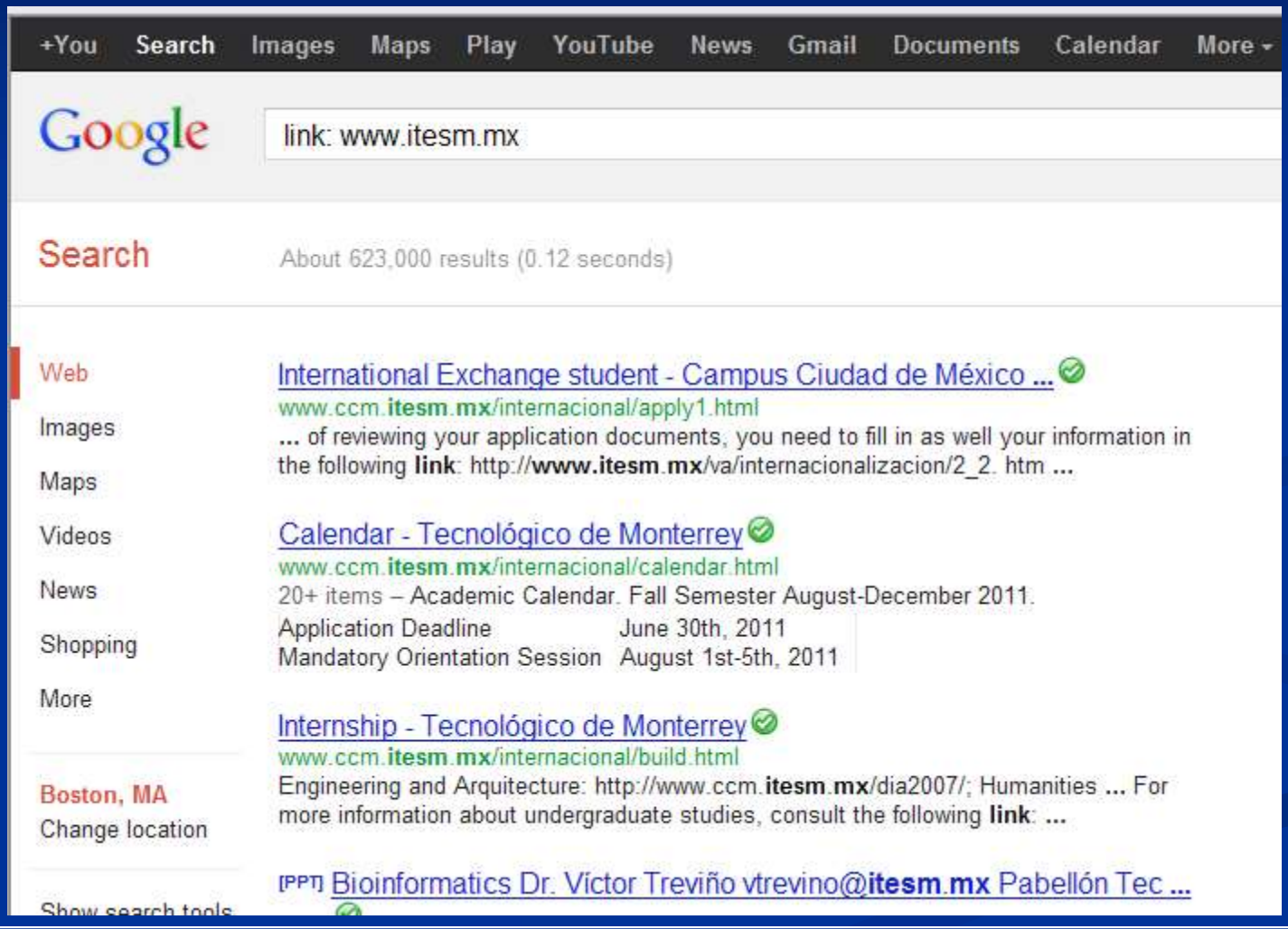

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¿Qué pasa si utilizamos los operadores con palabras en otro idioma? Nada, los operadores funcionan perfectamente con cualquier palabra

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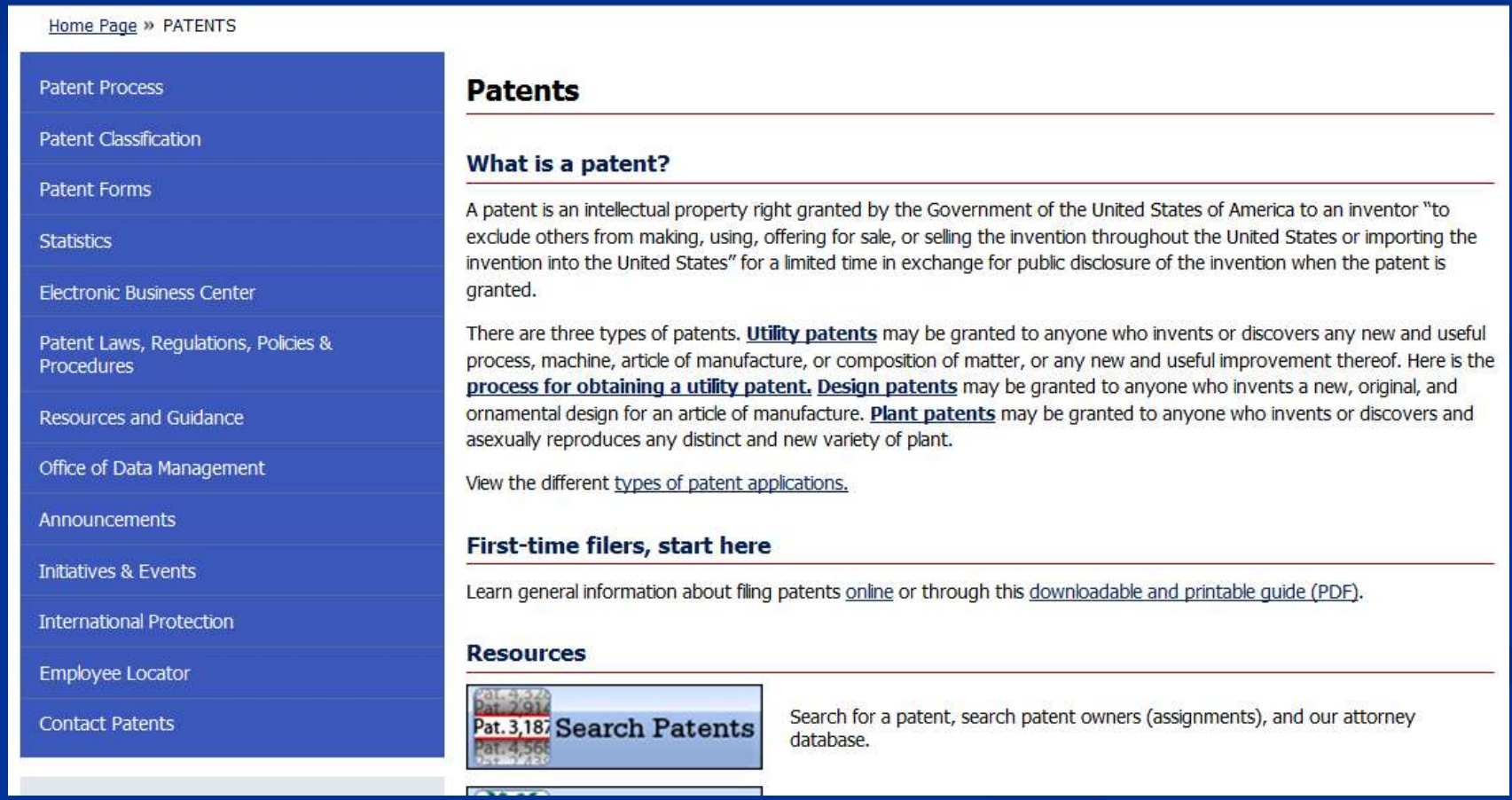

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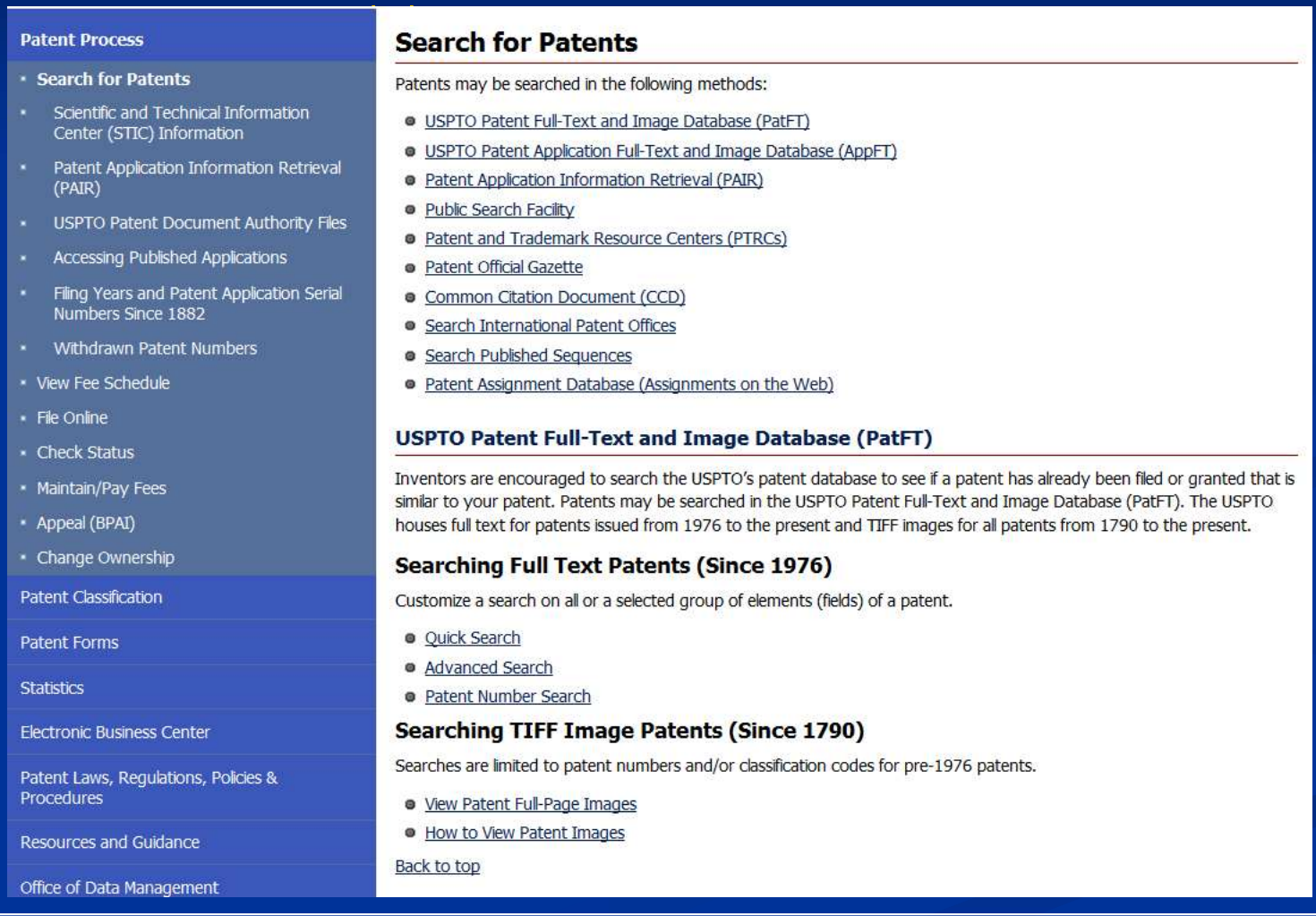

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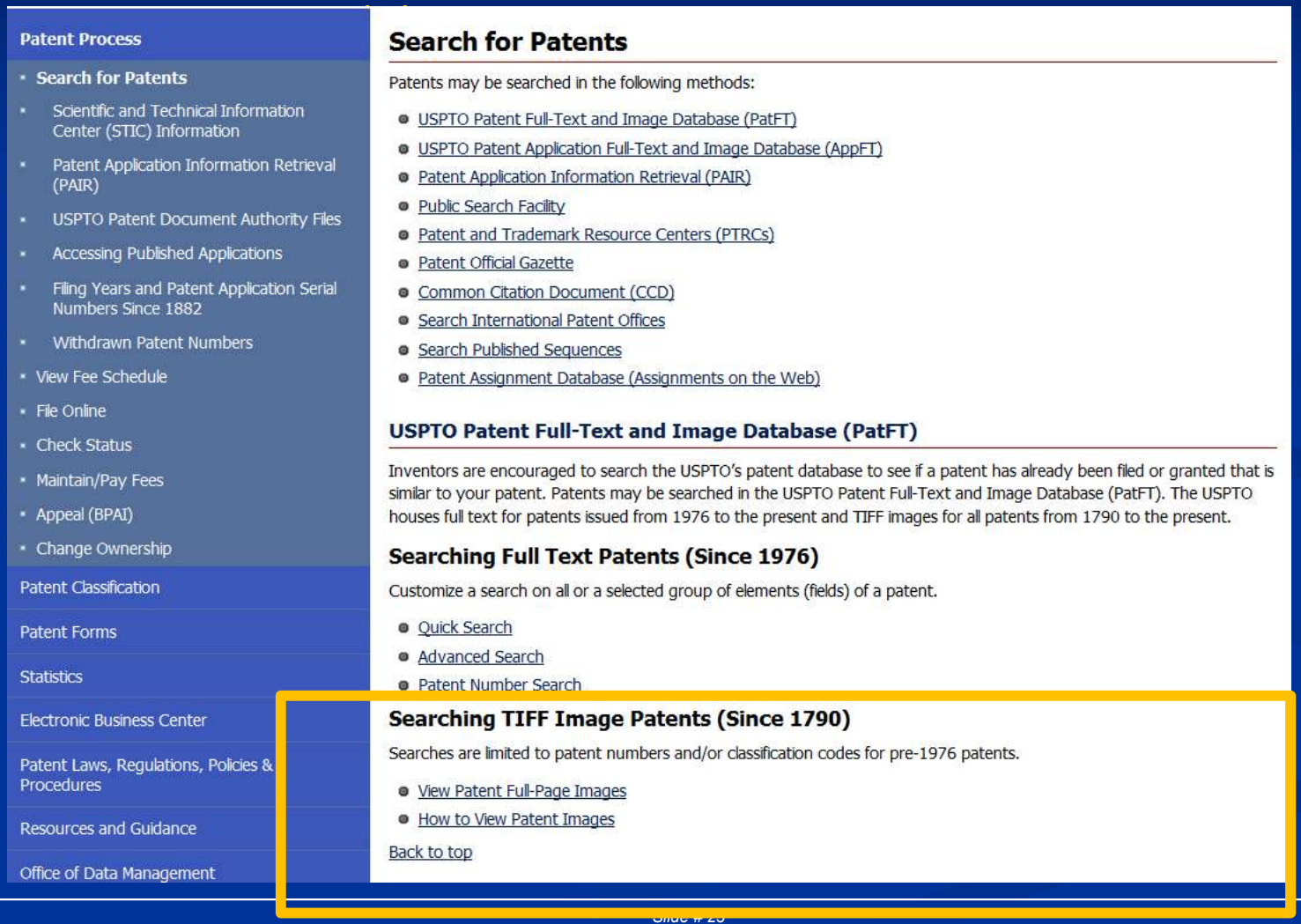

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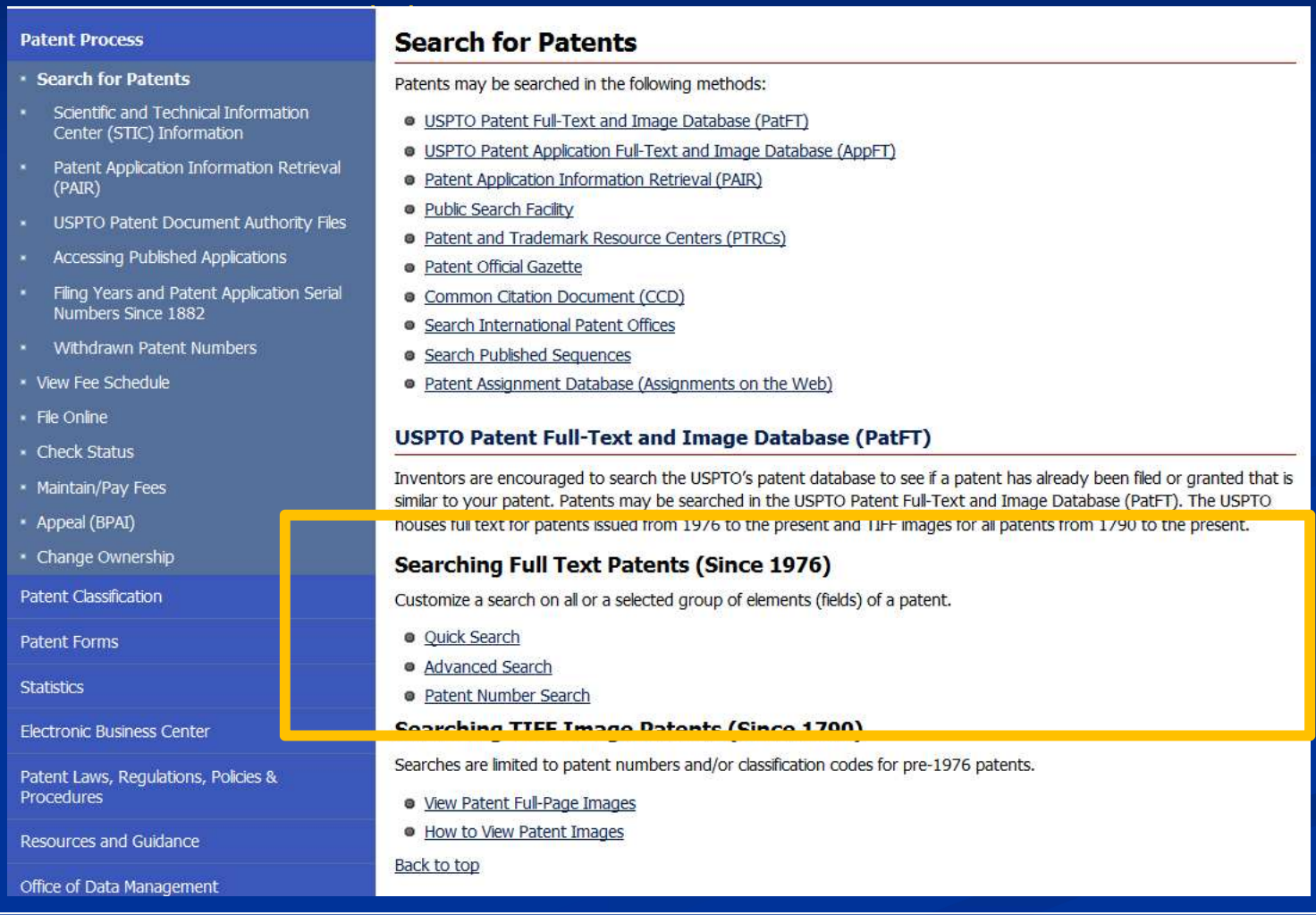

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	PUB. APP. NO.	Title
1	20100105129	Biomass production system
2	20070262578	Label sheet assembly, application kit and method of using the same
3	20050040834	Fuel quality sensor assembly and method of use
4	20040267465	Apparatus and method for measuring fluid characteristics
5	20040263324	Tire pressure sensor body and installation method
6	20040056670	Fuel quality sensor assembly and method of use
7	20040055371	PACKAGING FOR RF SIGNAL SENSOR WITH BATTERY CHANGING CAPABILITIES AND METHOD OF USING
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9	20040011339	Control routine for a current driver

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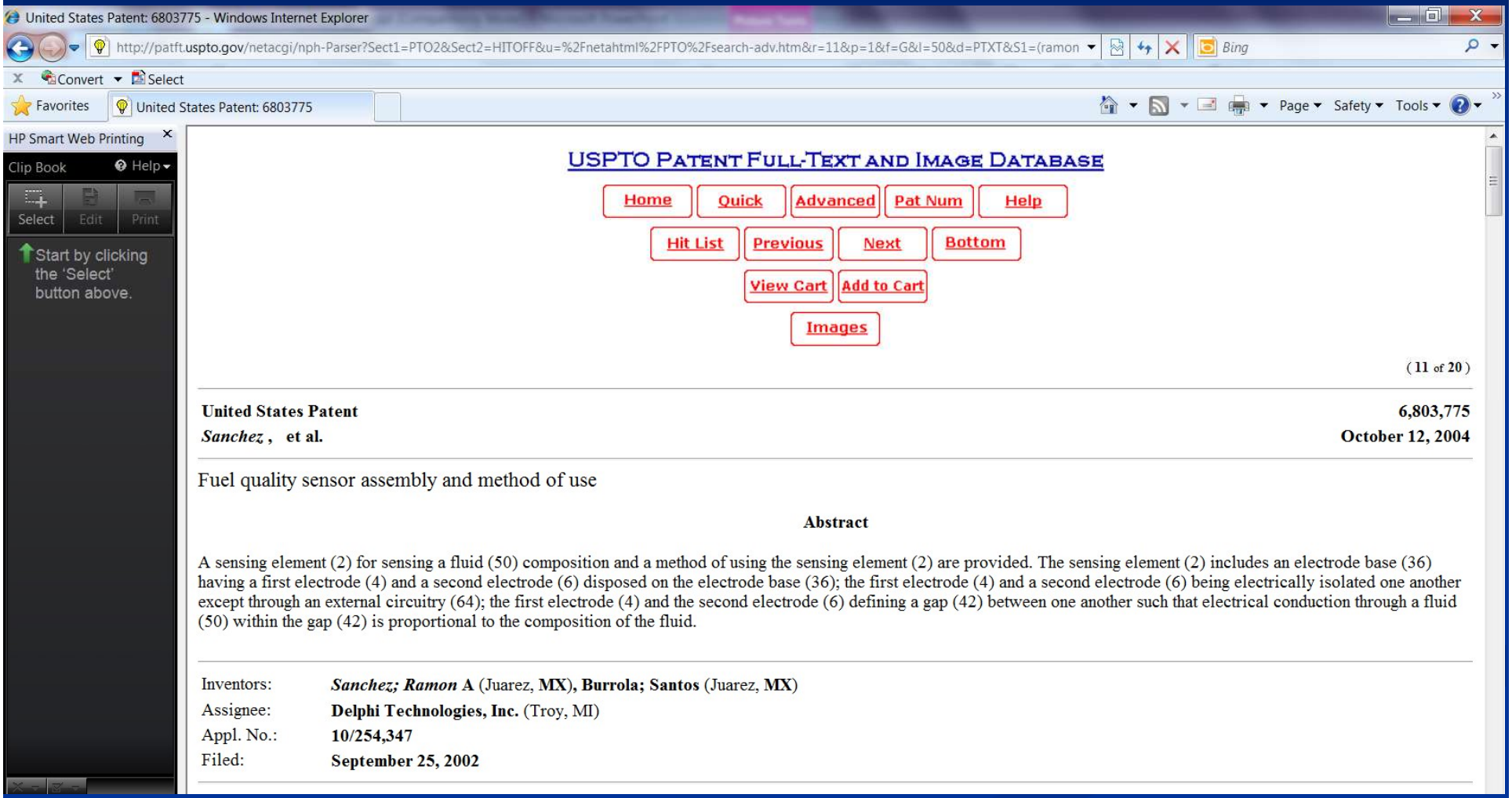

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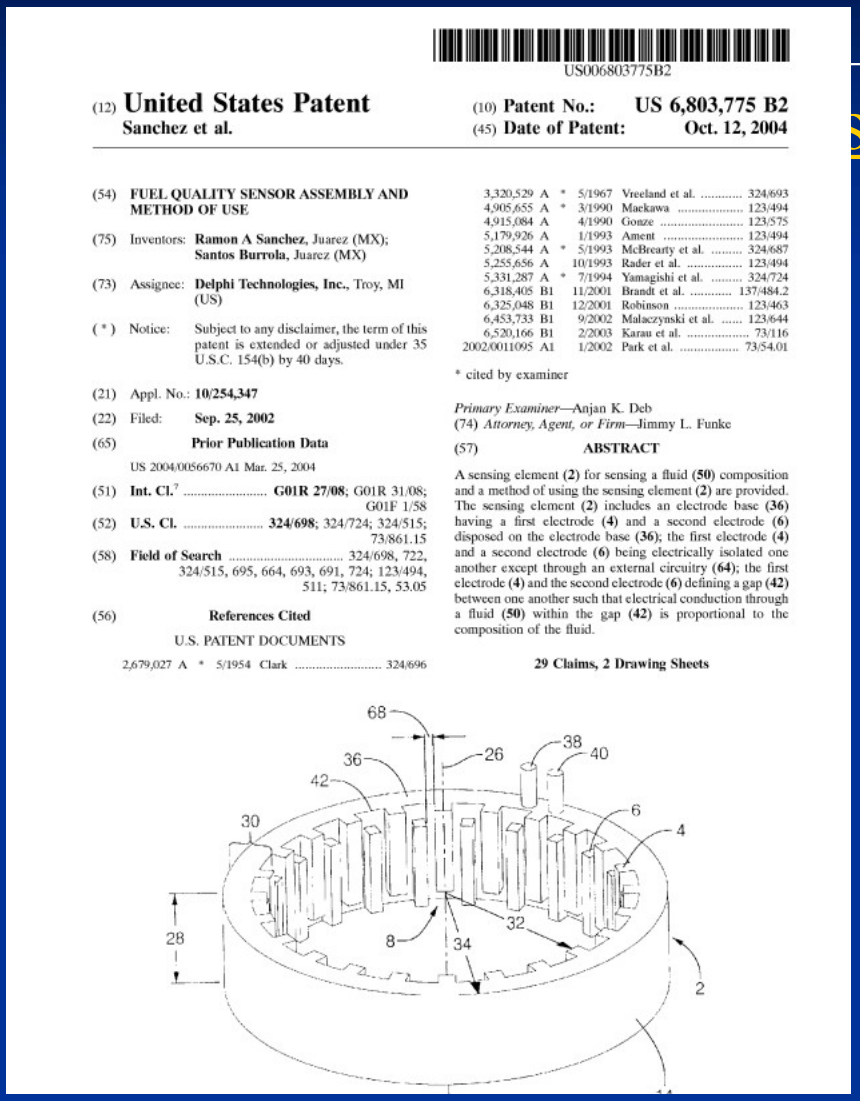

US006803775B2

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

(10) **Patent No.: US 6,803,775 B2**
(45) **Date of Patent: Oct. 12, 2004**

(54) **FUEL QUALITY SENSOR ASSEMBLY AND METHOD OF USE**

(75) Inventors: **Ramon A Sanchez**, Juarez (MX); **Santos Burrola**, Juarez (MX)

(73) Assignee: **Delphi Technologies, Inc.**, Troy, MI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 40 days.

(21) Appl. No.: **10/254,347**

(22) Filed: **Sep. 25, 2002**

(65) **Prior Publication Data**

US 2004/0056670 A1 Mar. 25, 2004

(51) **Int. Cl.**[7] **G01R 27/08**; G01R 31/08; G01F 1/58

(52) **U.S. Cl.** **324/698**; 324/724; 324/515; 73/861.15

(58) **Field of Search** 324/698, 722, 324/515, 695, 664, 693, 691, 724; 123/494, 511; 73/861.15, 53.05

(56) **References Cited**

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* cited by examiner

Primary Examiner—Anjan K. Deb
(74) *Attorney, Agent, or Firm*—Jimmy L. Funke

(57) **ABSTRACT**

A sensing element **(2)** for sensing a fluid **(50)** composition and a method of using the sensing element **(2)** are provided. The sensing element **(2)** includes an electrode base **(36)** having a first electrode **(4)** and a second electrode **(6)** disposed on the electrode base **(36)**; the first electrode **(4)** and a second electrode **(6)** being electrically isolated one another except through an external circuitry **(64)**; the first electrode **(4)** and the second electrode **(6)** defining a gap **(42)** between one another such that electrical conduction through a fluid **(50)** within the gap **(42)** is proportional to the composition of the fluid.

29 Claims, 2 Drawing Sheets

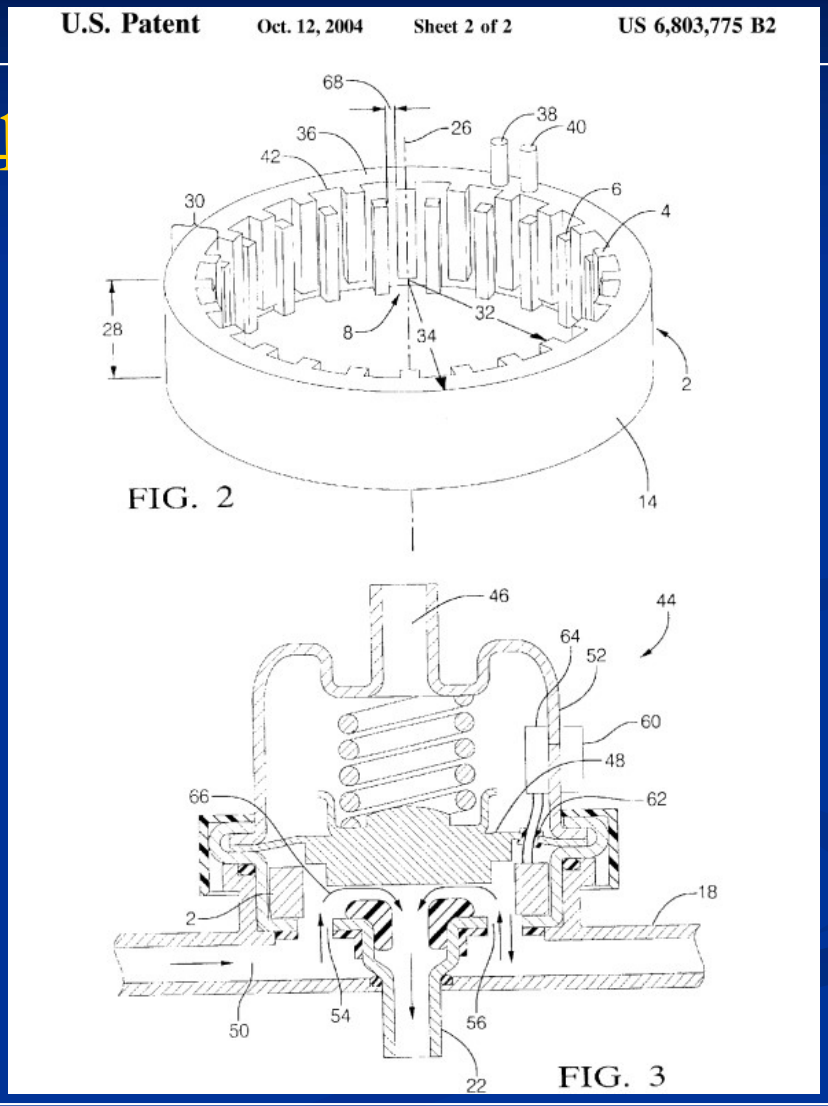

FIG. 2

FIG. 3

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FUEL QUALITY SENSOR ASSEMBLY AND METHOD OF USE

BACKGROUND

Fuel used in internal combustion engines is typically contained in a tank or reservoir as a mixture. Depending on the source of the fuel, it may comprise one or more different fuel components in an unknown ratio. Automobile fuel, for example may be gasoline, including any of its variant blends of aliphatic, olefinic, and/or aromatic hydrocarbons. It may further include various alcohols such as methanol, ethanol, propanol, butanol, pentanol, octanol, and the like. Other components that may be present include octane improvers such as methyl tertiary butyl ether (MTBE) and the like.

Each of these fuel components requires different parameters for optimal combustion. These parameters include specific air to fuel ratios, spark plug timing, injector volume, and the like. When the precise composition of the fuel is unknown, or is ever-changing, accurate determination of the optimal combustion parameters depends on being able to quickly and accurately sense fuel mixture composition and other parameters indicative of optimal end use parameters. One approach to optimal engine operation requires the ability to sense characteristics of the fuel, and adjust the operational conditions of the engine accordingly.

Systems have been designed to sense the characteristics of various blends of fuels, such as gasoline and methanol. U.S. Pat. No. 4,438,749 to Schwippert is directed to an optical sensor that uses the overall refractive index of the fuel as an indication of composition. Aromatic content of the fuel and clouding of the optical sensor elements over time can result in variations of refractive index that lead to inaccuracy in the sensor output.

Microwave fuel composition sensors utilize the fuels overall dielectric constant through microwave attenuation. Besides adding significant cost, these sensors operate at extremely high frequencies (e.g., 1–30 Giga Hertz) and generate amounts of electromagnetic noise that can interfere with other electronic components.

Sensors, which utilize the fuel mixture as a dielectric in a capacitive cell, are also capable of correlating the dielectric constant of a fuel mixture to its composition. These sensors have the benefit of being rugged and can be designed for used in environments in which other sensors would be unacceptable. Unfortunately, the conductivity of various fuel mixtures varies in a non-linear relationship depending on component concentrations. This phenomena is made worse by impurities, especially water. These sensors also need to be made relatively large as compared to other sensors to achieve the level of sensitivity required to sense fuel in an efficient manner. Space and size limitations imposed by design, and the need to minimize void volume in fuel delivery systems, among other factors, have limited the usefulness of capacitive fuel sensors in automotive fuel delivery system applications. A rugged, compact sensor having a sensitivity capable of discriminating between a wide range of fuel blends would be beneficial to optimal combustion of fuel, especially in an internal combustion engine.

SUMMARY

Described herein is a sensing element for measuring a fluid composition comprising: an electrode base having a first electrode and a second electrode disposed thereon; the first electrode and said second electrode being electrically isolated from one another; said first electrode and said second electrode being configured, dimensioned, and positioned to define a gap therebetween such that electrical conduction through the fluid within said gap is proportional to the composition of said fluid.

Also disclosed is a method of sensing a fluid composition comprising: contacting said fluid composition with a sensing element in communication with a circuitry, said sensing element comprising: an electrode base having a first electrode and a second electrode disposed thereon; said first electrode and said second electrode being electrically isolated from one another, except through said circuitry; said first electrode and said second electrode being configured, dimensioned, and positioned to define a gap therebetween such that electrical conduction through a fluid within said gap is proportional to the composition of said fluid; a first electrical connector to provide electrical communication between said first electrode and said circuitry; and a second electrical connector to provide electrical communication between said second electrode and said circuitry; determining said electrical conduction of said fluid; and correlating said electrical conduction to said fluid composition.

Further disclosed herein is a combined fluid pressure regulator and assembly for sensing a fluid composition, comprising: a sensing element disposed within a fluid flow path located within a fluid pressure regulator housing; said sensing element comprising: an electrode base having a first electrode and a second electrode disposed thereon; said first electrode and said second electrode being electrically isolated from one another except through an external circuitry; said electrode base having an inner surface and an outer surface separated by a thickness; said outer surface being continuously disposed around a central axis to form an essentially cylindrical shape; said electrode base defining a flow path parallel to said central axis having a flow path length; said first electrode being a plurality of first electrode teeth disposed on said inner surface depending away from said outer surface towards said central axis; said second electrode being a plurality of second electrode teeth on said inner surface depending away from said outer surface towards said central axis; said first electrode teeth and said second electrode teeth being configured, dimensioned, and positioned in a substantially alternating pattern to define a plurality of gaps therebetween such that electrical conduction through a fluid within said plurality of gaps is proportional to a composition of said fluid; said fluid pressure regulator housing comprising a first fluid conduit and a second fluid conduit which allows said fluid to travel through said fluid flow path located with said fluid pressure regulator housing; a regulator valve mounted therein responsive to a fluid demand and disposed in sealing communication between said first conduit and a bypass conduit; a first electrical connector being channeled through a sealing member disposed in said regulator valve to provide electrical communication between said first electrode and said external circuitry; and a second electrical connector being channeled through a sealing member disposed in said regulator valve to provide electrical communication between said second electrode and said external circuitry.

The above described and other features are exemplified by the following figures and detailed description.

DRAWINGS

Referring now to the figures wherein like elements are numbered alike:

FIG. **1** shows a combustion engine having a fuel composition sensor;

another to form a single first electrode. Also, the structures that form the second electrode teeth **6** are all preferably in electrical contact with one another to form a single second electrode. First and second electrical connectors **38** and **40** provide electrical conductivity between the electrodes and external circuitry. Both of which are in electrical contact with their respective electrodes **4** and **6**, but are electrically isolated from each other. The multiple teeth or other such structures serve to increase the available surface area available for sensing given the total size of the sensing element. This is important because the overall sensitivity of the sensing element increases as the available surface area increases.

The value of the outer dimension **34**, the inner dimension **32**, and the fluid passage length **28** depend on the characteristics required of the sensor element **2**. Each of these two electrodes also has an associated total surface area. By defining the total surface area of the electrodes as being the underlying geometric surface area (e.g., for a rectangle, base multiplied by height), the total surface area of the first electrode, when the sensor is used, for example, in a fuel delivery system, is greater than or equal to about 50 square millimeters (mm^2) Preferably within this range, the total surface area of the first electrode is greater than or equal to about 90, more preferably greater than or equal to about 300 mm^2 as represented by the underlying geometric area.

Also, by defining the total surface area of the first electrode as being equal to unity (i.e., equal to one), the proportion of the total surface area of the first electrode to the total surface area of the second electrode determined in the same way is a ratio of about 1 to 0.01, to a ratio of about 1 to 100. Preferably within this range, the proportion of total surface areas of the first electrode to the total surface area of the second electrode is a ratio of greater than or equal to about 1 to 0.1, more preferably greater than or equal to about 1 to 0.5. Also within this range, the proportion of total surface areas of the first electrode to the total surface area of the second electrode is a ratio of less than or equal to about 1 to 10, more preferably less than or equal to about 1 to 2, with a ratio of 1:1 being most preferred.

The sensing element is preferably located within a housing to form a sensing assembly **20**. The sensing element **2** is disposed within the housing and arranged such that the fluid of interest is able to occupy the gaps **42** between the electrodes and thus be in contact with the sensing element. Preferably, the housing is closed except for a fluid inlet conduit and a fluid outlet conduit. The housing provides a conduit or flow path between the inlet an outlet conduits, and in communication with the sensing element. Preferably, the fluid is able to enter the housing, contact the sensing element along the fluid passage length **28**, and then exit the housing.

When used to determine the composition of fuel for an internal combustion engine, for example, the sensing assembly is preferably located in close proximity to the point at which the fuel is combusted and also preferably has a total volume that does not interfere with optimal combustion of the fuel.

To prevent extraneous effects between the housing and the sensing element, the shape of the housing is preferably complementary to the shape of the outer surface of the sensing element. As used herein the term complementary is defined as the two being essentially the same. For example, when the outer surface of the sensing element is essentially cylindrical, the housing is thus preferably essentially cylindrical and the housing also has an inner diameter in excess of the outer diameter of the sensing element to allow fuel to freely flow within the housing.

In the embodiment shown in FIG. **3**, the sensing element **2** is disposed within a fuel pressure regulator **44**. Within the fuel pressure regulator-housing **52** is a regulator valve **48** disposed in sealing communication between a fluid rail conduit **18**, and a bypass conduit **22**. Preferably, the regulator valve **48** is responsive to fluid demand via pneumatic communication with an air intake manifold through manifold conduit **46**. In this arrangement, the sensor element **2** is concentrically disposed within, and bounded by the fuel pressure regulator housing **52** and by the regulator valve **48**. A fluid conduit or flow path **66** between the fuel rail inlet **54** and the fuel rail outlet **56** is provided by the regulator housing **52** such that the sensing element **2** is located within this flow path **66**.

Electrical connection between the sensing element **2** and an external electronic system is preferably provided by directing the electrical connectors **38** and **40** through a sealing member **62** located within the regulator valve assembly **44**, and preferably to an external electrical connector **60**. Also, a portion of and/or all of the necessary electronics may be located as on electronics package **64** within a portion of the housing **52**, depending on space limitations and design needs.

The sensor is in communication with, and preferably electrically connected to an electronic circuitry capable of providing information as to the composition of the fluid the sensor comes in contact with. The electronic circuitry may include a computer or computers capable of using the information derived from the sensor to adjust the combustion parameters of the engine to an optimal value for the fuel mixture flowing through sensor. For this purpose, the computer or computers can include a standard read only memory (ROM) containing a multiple dimensioned lookup table containing compensation factors to be repeatedly looked up with a combination of capacitance and other factors including ambient and engine temperature, exhaust gas composition, ambient air analysis and the like. These compensation factors can be used directly, or can be associated with additional inputs and lookup tables.

While preferred embodiments have been shown and described, various modifications and substitutions may be made thereto without departing from the spirit and scope of the invention. Accordingly, it is to be understood that the apparatus and method have been described by way of illustration only, and such illustrations and embodiments as have been disclosed herein are not to be construed as limiting to the claims.

We claim:

1. A sensing element for measuring a fluid composition comprising:

an electrode base being disposed about an axis, said electrode base having an inner surface defining an aperture extending through the electrode base for allowing a fluid to flow therethrough; and

a first electrode and a second electrode coupled to said electrode base and electrically isolated from one another, said first electrode having a first plurality of electrode teeth extending radially inwardly from said inner surface of the electrode base into said aperture, and said second electrode having a second plurality of electrode teeth extending radially inwardly from said inner surface into said aperture, said first plurality of electrode teeth being electrically connected together, and said second plurality of electrode teeth being electrically connected together, wherein said second plurality of electrode teeth are arranged in a substan-

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2	8,110,163	Complexation and removal of heavy metals from flue gas desulfurization systems
3	8,047,007	Methods for generating electricity from carbonaceous material with substantially no carbon dioxide emissions
4	7,988,754	Process for producing clean liquid fuels from coal waste
5	7,937,948	Systems and methods for generating electricity from carbonaceous material with substantially no carbon dioxide emissions
6	7,892,303	Mixed fuel coal burner for gas turbines
7	7,883,556	Dual fuel slagging gasifier
8	7,846,260	On-line automatic cleaning device for a condenser in a turbine generator
9	7,786,327	Method for co-producing electric power and urea from carbonaceous material
10	7,767,097	Ozonated capacitive deionization process & product water

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United States Patent **8,110,163**
Keiser , et al. **February 7, 2012**

Complexation and removal of heavy metals from flue gas desulfurization systems

Abstract

A method for the reduction of the emission of mercury into the environment from the burning of fossil fuels with the use of polydithiocarbamic compounds. The polydithiocarbamic compounds are used for the capture of mercury from the resulting flue gases using a flue gas desulfrization systems or scrubbers. The method uses polydithiocarbamic compounds in conjunction with a scrubber to capture mercury and reduce its emission and/or re-emission with stack gases. The method is a unique process of reducing the toxic levels of mercury, which allows for the use of ***coal as a clean*** and environmentally friendlier fuel source.

Inventors: **Keiser; Bruce A** (Naperville, IL), **Shah; Jitendra** (Naperville, IL), **Sommese; Anthony G.** (Aurora, IL), **Capener; Lars E.** (Aurora, IL), **TenEyck; Peter** (Wexford, PA), **Wysk; Ralf** (Dorsten, **DE**)

Assignee: **Nalco Company** (Naperville, IL)

Appl. No.: **11/952,637**

Filed: **December 7, 2007**

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

(10) **Patent No.: US 8,110,163 B2**
(45) **Date of Patent: Feb. 7, 2012**

(54) **COMPLEXATION AND REMOVAL OF HEAVY METALS FROM FLUE GAS DESULFURIZATION SYSTEMS**

(75) Inventors: **Bruce A Keiser**, Naperville, IL (US); **Jitendra Shah**, Naperville, IL (US); **Anthony G. Sommese**, Aurora, IL (US); **Lars E. Capener**, Aurora, IL (US); **Peter TenEyck**, Wexford, PA (US); **Ralf Wysk**, Dorsten (DE)

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(*) 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.: **11/952,637**

(22) Filed: **Dec. 7, 2007**

(65) **Prior Publication Data**

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B01D 53/64 (2006.01)

(52) **U.S. Cl.** **423/210**; 210/729; 210/735; 210/914

(58) **Field of Classification Search** 423/210; 210/729, 735, 914

See application file for complete search history.

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Primary Examiner — Timothy Vanoy
(74) *Attorney, Agent, or Firm* — Edward O. Yonter; Michael B. Martin

(57) **ABSTRACT**

A method for the reduction of the emission of mercury into the environment from the burning of fossil fuels with the use of polydithiocarbamic compounds. The polydithiocarbamic compounds are used for the capture of mercury from the resulting flue gases using a flue gas desulfrization systems or scrubbers. The method uses polydithiocarbamic compounds in conjunction with a scrubber to capture mercury and reduce its emission and/or re-emission with stack gases. The method is a unique process of reducing the toxic levels of mercury, which allows for the use of coal as a clean and environmentally friendlier fuel source.

25 Claims, No Drawings

COMPLEXATION AND REMOVAL OF HEAVY METALS FROM FLUE GAS DESULFURIZATION SYSTEMS

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TECHNICAL FIELD

This invention relates to the reduction of the emission of mercury into the environment from the burning of coal and/or other carbon-based fuels. The invention relates to the method of the capture of mercury from flue gases by flue gas desulfurization systems or scrubbers. The invention demonstrates the method of reducing the toxic levels of mercury, which allows for the use of coal as a clean and environmentally friendlier fuel source.

BACKGROUND

The demand for electricity continues to grow globally. In order to keep stride with the growing demand, coal is being looked to as a source for its generation. At present, burning coal produces some 50% of the electricity generated in the United States. The burning of coal in power generation plants results in the release of energy, as well as the production of solid waste such as bottom and fly ash, and flue gas emissions into the environment. Emissions Standards, as articulated in The Clean Air Act Amendments of 1990 as established by the U.S. Environmental Protection Agency (EPA), requires the assessment of hazardous air pollutants from utility power plants.

The primary gas emissions are criteria pollutants (e.g. sulfur dioxide, nitrogen dioxides, particulate material, and carbon monoxide). About two thirds of all sulfur dioxide and a quarter of the nitrogen dioxide in the atmosphere is attributable to electric power generation achieved by burning coal and other fuels.

Secondary emissions depend on the type of coal or fuel being combusted but include as examples mercury, selenium, arsenic, and boron. Coal-fired utility boilers are known to be a major source of anthropogenic mercury emissions in the United States. In December of 2000, the EPA announced their intention to regulate mercury emissions from coal-fired utility boilers despite the fact that a proven best available technology (BAT) did not exist to capture or control the levels of mercury released by the combustion of coal. This has been further complicated by the lack of quick, reliable, continuous monitoring methods for mercury.

The fact remains that mercury is found in coals at concentrations ranging from 0.02 to 1 ppm. The mercury is present as sulfides, or associated with organic matter. Upon combustion the mercury is released and emitted into the flue gas as gaseous elemental mercury and other mercury compounds. The mercury appears in the flue gas in both the solid and gas phases (particulate-bound mercury and vapor-phase mercury, respectively). The so-called solid phase mercury is really vapor-phase mercury adsorbed onto the surface of ash and/or carbon particles. The solid-phase mercury can be captured by existing particle control devices (PCDs) such as electrostatic precipitators (ESPs) and fabric filters (FF), the latter is sometimes referred to as baghouses.

A review of data collected by the EPA in 1999 under the Mercury Information Collection Request (ICR) showed that PCDs alone could capture from 20 to 42% of the total mercury in the fuel. Of course, the efficiency of this strategy depends on the fuel composition, the operating temperature and design of the PCD. Indeed, it has been found that fabric filters tend to exhibit better particulate laden mercury removal, compared to cold-side ESPs, as a result of the formation of filter cake within the filter. The filter cake contains constituents that absorb and/or adsorb mercury such as unreacted carbon, activated carbon, iron, and fly ash. As such the filter cake can act as a site to facilitate gas-solid reactions between the vapor-phase mercury and the trapped solid particulate. The data suggests FFs can currently achieve as much as 82% mercury capture.

The volatility of mercury and many of its compounds results in a significant portion of the total mercury existing as vapor-phase mercury in the flue gases. Vapor-phase mercury is composed of elemental mercury and oxidized mercury, the relative amounts of these forms being dependent on the amount of chloride in the coal, iron oxide levels in the coal and other constituents in the fly ash as examples. Speciation, which refers to the form of vapor-phase mercury, is a key parameter in development and design of capture strategies for mercury emissions. Generally there are two forms of mercury that constitute vapor-phase mercury. The forms are oxidized (Hg^{2+} as an example) and elemental (Hg^{0}) mercury.

Several control strategies have been developed for the control of mercury emissions from coal-fired boilers. Some of these methods include injection of activated carbon, modified activated carbon, various chemical catalysts, and inorganic sorbents. Unfortunately, none of these strategies removes all the mercury from the flue gas. The efficiencies range from as low as 30% to as high as 80% based on the amount of mercury entering the system with the coal. In addition, these technologies either produce unwanted effects on by-products such as impacting the quality of fly ash, or generate additional waste streams for the power plant. Both lead to higher operational costs for the power plant. One promising strategy is to take advantage of existing air pollution control devices or APCDs to augment or to serve as the primary means to remove vapor-phase mercury. Two examples of APCDs are semi-dry and wet scrubbers or Flue Gas Desulfurizer (FGD). Semi-dry FGDs are also known as Spray Dryer Absorbers or SDAs.

Sulfur oxides (SO_x) regulatory compliance mandates the use of at least one of several control strategies. Three such strategies that are used in the US are sorbent injection into the boiler during coal burning and wet or dry Flue Gas Desulfurizers. At present about 3% of the coal-fired power plants are using sorbent injection. FGD scrubbing accounts for 85% using wet and 12% using dry scrubber technologies. Wet scrubbers achieve greater than 90% SO_x removal efficiency compared to 80% by dry scrubbing. In wet scrubbers, the flue gas is brought into contact with slurry containing an alkaline calcium mineral, such as lime or limestone. The SO_x is adsorbed into the water and reacts to form calcium sulfite. It has been demonstrated that simultaneous to SO_x capture, wet FGDs can be used to capture vapor-phase mercury from the flue gas.

Elemental mercury is water insoluble and is not removed by a wet FGD. In contrast, oxidized mercury in the flue gas is water-soluble and is removed. The ICR mercury data demonstrated that ionic mercury is removed effectively approaching 90% by wet FGDs. Hence, one strategy for mercury capture is to oxidize all the mercury during the burning of the

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US 20100105129A1

(19) **United States**

(12) **Patent Application Publication**

Sanchez-Pina et al.

(10) **Pub. No.: US 2010/0105129 A1**

(43) **Pub. Date: Apr. 29, 2010**

(54) **BIOMASS PRODUCTION SYSTEM**

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BOSTON, MA 02109-2004 (US)

(21) Appl. No.: **12/290,044**

(22) Filed: **Oct. 27, 2008**

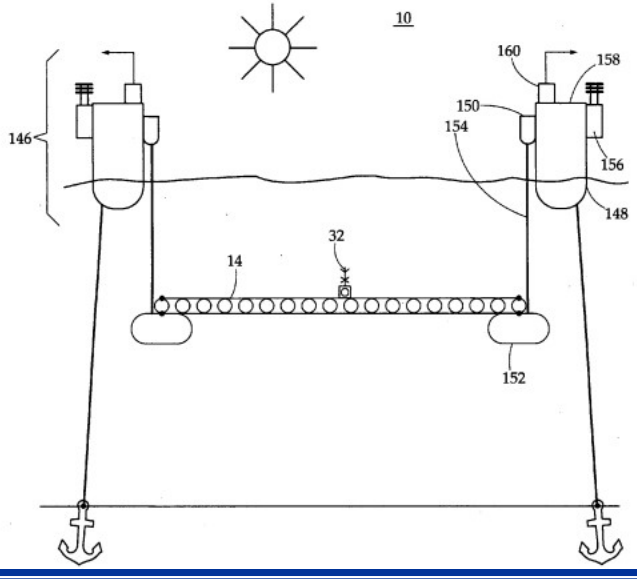
Publication Classification

(51) **Int. Cl.**
C12M 1/09 (2006.01)
C12M 3/00 (2006.01)

(52) **U.S. Cl.** **435/286.5**; 435/292.1

(57) **ABSTRACT**

A system preferably for light irradiation, wherein the system includes a support structure, wherein the support structure is able to accommodate an array of vessels capable of receiving light; the system includes a buoyancy support system and a feeding harvesting system, wherein the buoyancy support system is in fluid and data communication with the array of vessels to regulate the amount of light introduced into the vessels within a fluid medium.



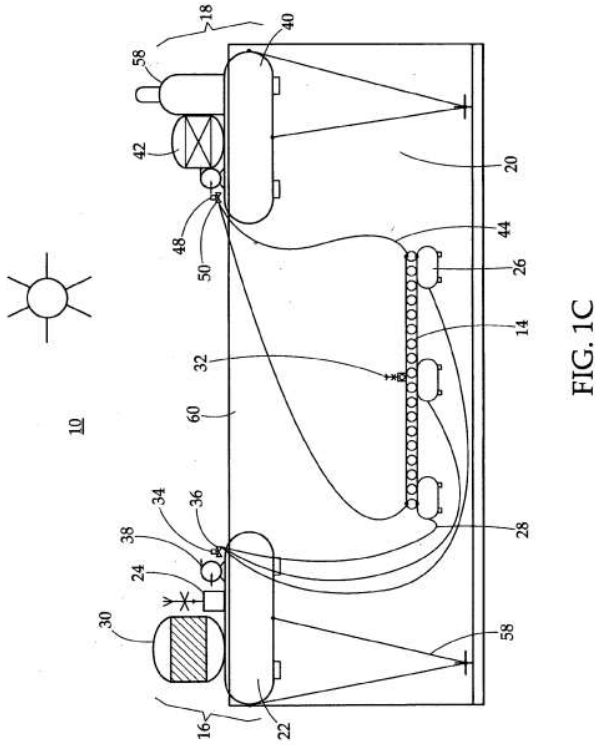


FIG. 1C

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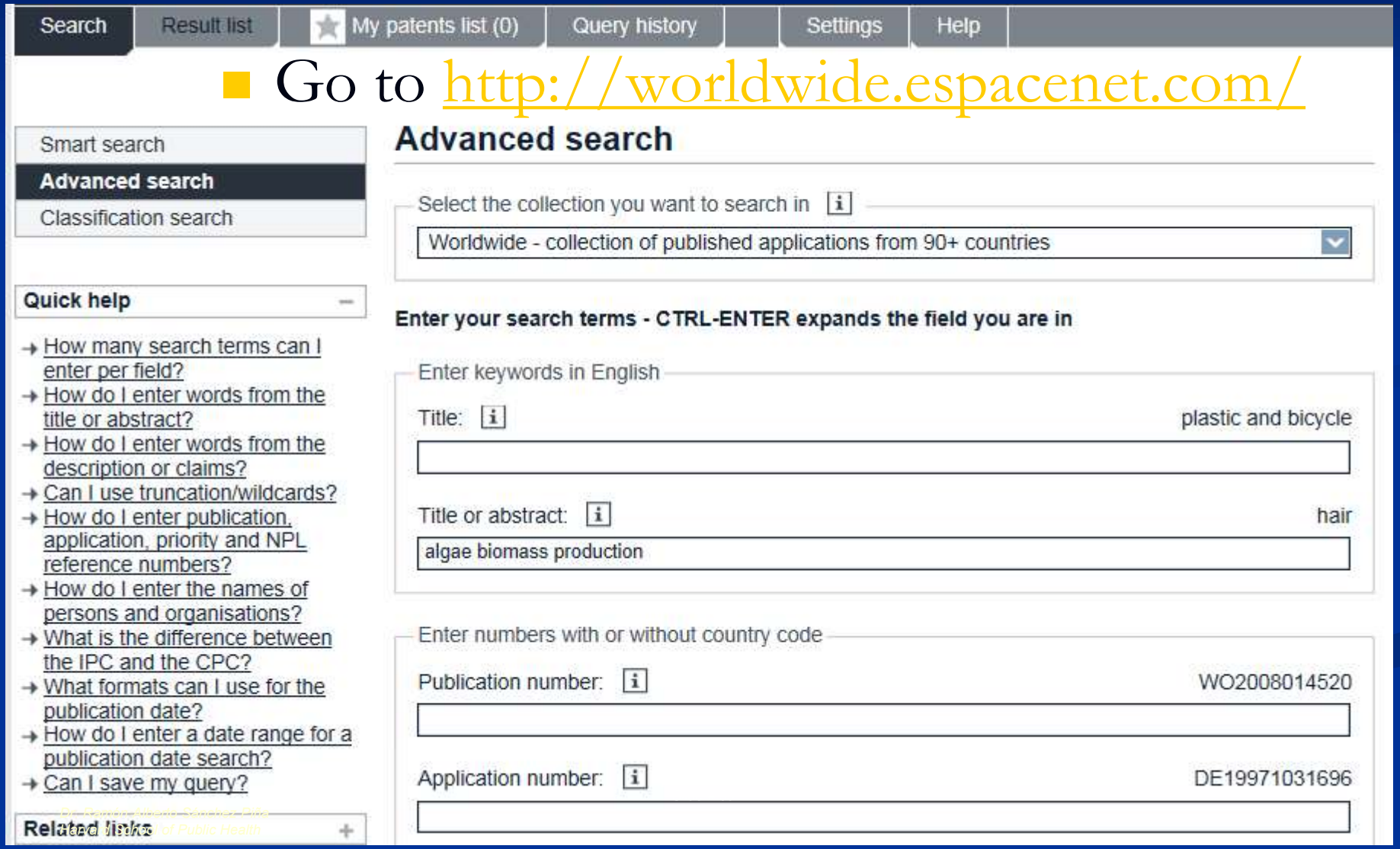

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20040101-20140530

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Applicant(s): Institut Pasteur

Inventor(s): Smith

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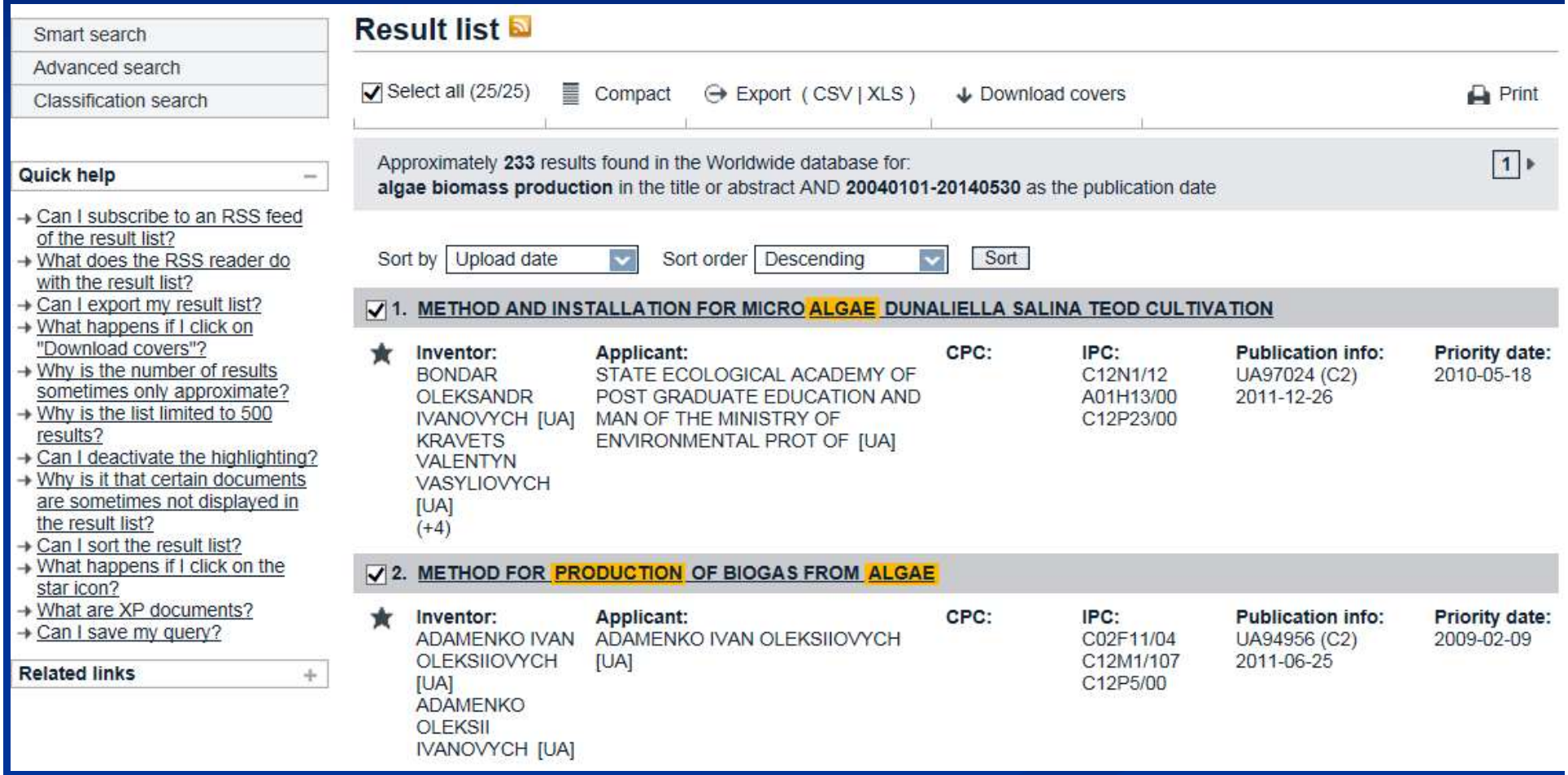

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1. METHOD AND INSTALLATION FOR MICRO ALGAE DUNALIELLA SALINA TEOD CULTIVATION

Inventor:	Applicant:	CPC:	IPC:	Publication info:	Priority date:
BONDAR OLEKSANDR IVANOVYCH [UA] KRAVETS VALENTYN VASYLIOVYCH [UA] (+4)	STATE ECOLOGICAL ACADEMY OF POST GRADUATE EDUCATION AND MAN OF THE MINISTRY OF ENVIRONMENTAL PROT OF [UA]		C12N1/12 A01H13/00 C12P23/00	UA97024 (C2) 2011-12-26	2010-05-18

2. METHOD FOR PRODUCTION OF BIOGAS FROM ALGAE

Inventor:	Applicant:	CPC:	IPC:	Publication info:	Priority date:
ADAMENKO IVAN OLEKSIIOVYCH [UA] ADAMENKO OLEKSII IVANOVYCH [UA]	ADAMENKO IVAN OLEKSIIOVYCH [UA]		C02F11/04 C12M1/107 C12P5/00	UA94956 (C2) 2011-06-25	2009-02-09

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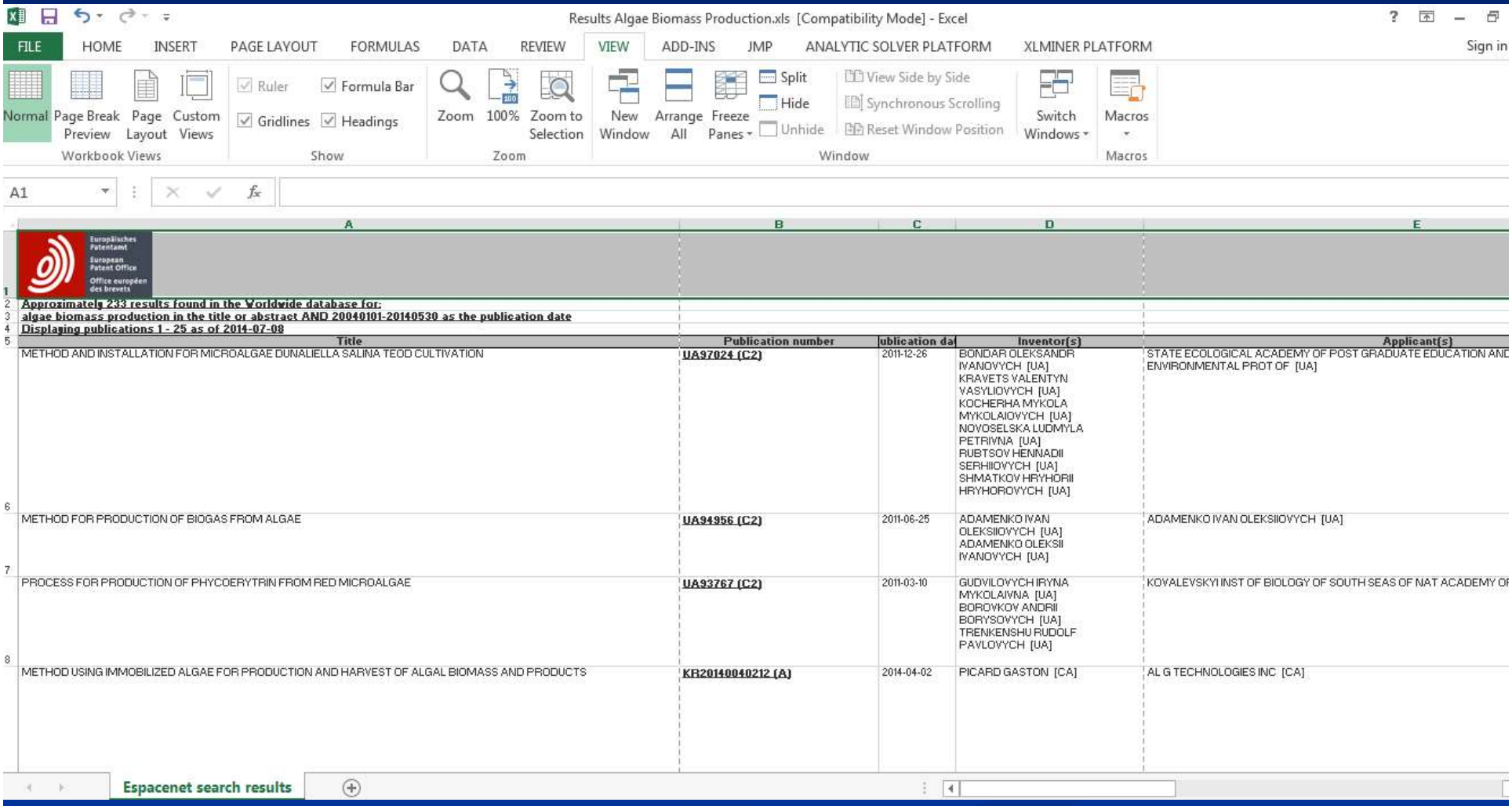

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Title	Publication number	Publication date	Inventor(s)	Applicant(s)
METHOD AND INSTALLATION FOR MICROALGAE DUNALIELLA SALINA TEOD CULTIVATION	UA97024 (C2)	2011-12-26	BONDAR OLEKSANDR IVANOVYCH [UA] KRAVETS VALENTYN VASYLIOVYCH [UA] KOCHERHA MYKOLA MYKOLAIOVYCH [UA] NOVOSELSKA LUDMYLA PETRIVNA [UA] RUBTSOV HENNADII SERHIIOVYCH [UA] SHMATKOV HRYHORII HRYHOROVYCH [UA]	STATE ECOLOGICAL ACADEMY OF POST GRADUATE EDUCATION AND ENVIRONMENTAL PROT OF [UA]
METHOD FOR PRODUCTION OF BIOGAS FROM ALGAE	UA94956 (C2)	2011-06-25	ADAMENKO IVAN OLEKSIIOVYCH [UA] ADAMENKO OLEKSII IVANOVYCH [UA]	ADAMENKO IVAN OLEKSIIOVYCH [UA]
PROCESS FOR PRODUCTION OF PHYCOERYTRIN FROM RED MICROALGAE	UA93767 (C2)	2011-03-10	GUDVILOVYCH IRYNA MYKOLAIVNA [UA] BOROVKOV ANDRII BORYSOVYCH [UA] TRENKENSHU RUDOLF PAVLOVYCH [UA]	KOVALEVSKYI INST OF BIOLOGY OF SOUTH SEAS OF NAT ACADEMY OF
METHOD USING IMMOBILIZED ALGAE FOR PRODUCTION AND HARVEST OF ALGAL BIOMASS AND PRODUCTS	KR20140040212 (A)	2014-04-02	PICARD GASTON [CA]	AL G TECHNOLOGIES INC [CA]

Espacenet search results

Dr. Ramón Alberto Sánchez Piña
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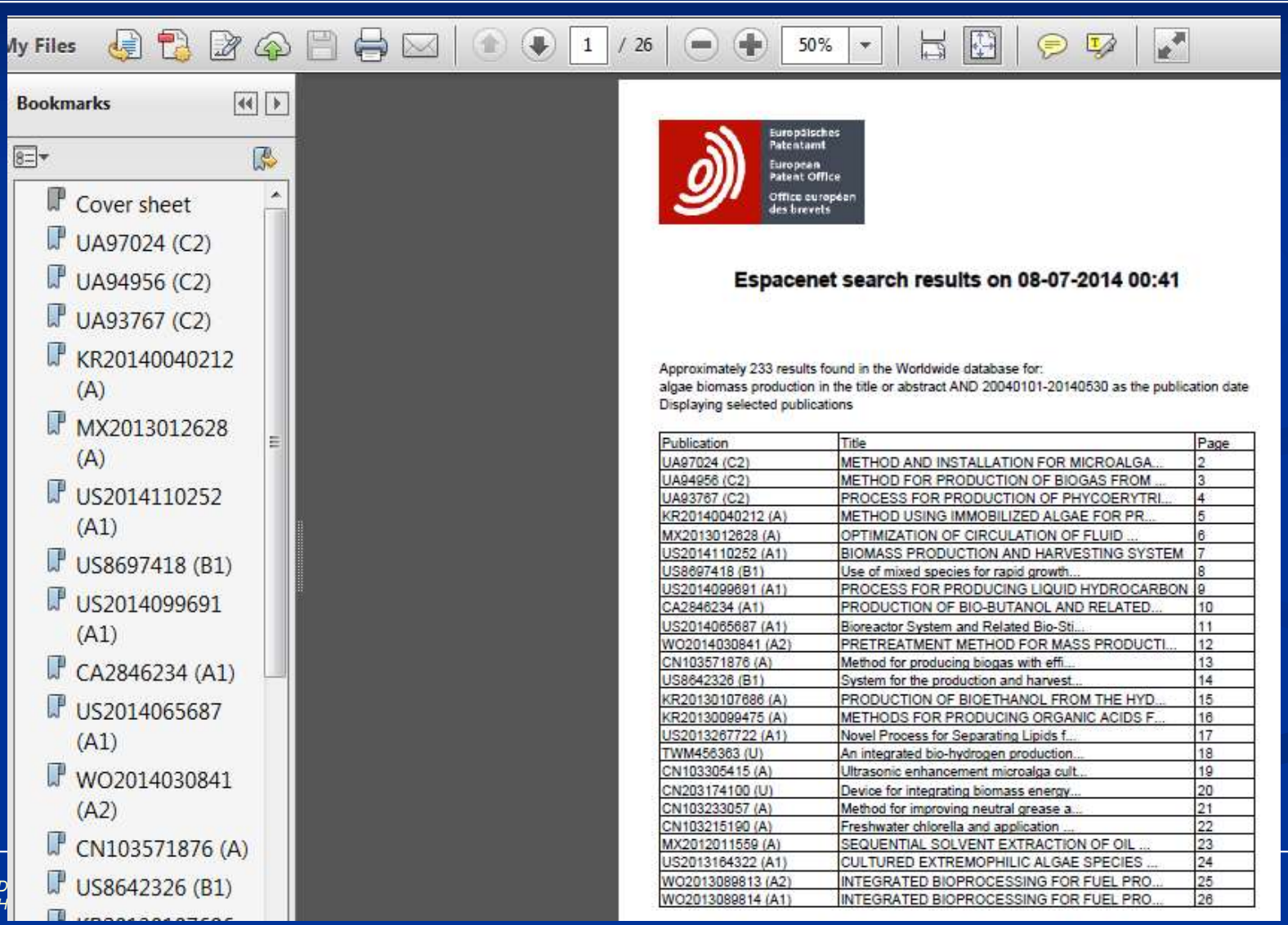

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공개특허 10-2014-0040212

(19) 대한민국특허청(KR)
(12) 공개특허공보(A)

(11) 공개번호 10-2014-0040212
(43) 공개일자 2014년04월02일

(51) 국제특허분류(Int. Cl.)
C12M 1/00 (2006.01) *C12N 1/12* (2006.01)
(21) 출원번호 10-2014-7000581
(22) 출원일자(국제) 2012년06월13일
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(86) 국제출원번호 PCT/CA2012/050397
(87) 국제공개번호 WO 2012/171123
국제공개일자 2012년12월20일
(30) 우선권주장
61/496,171 2011년06월13일 미국(US)

(71) 출원인
에이엘-에 테크놀로지즈 아이엔씨.
캐나다 퀘벡 퀴6엑스 1이7 리바이스 퍼 드 라 브리즈 8340
(72) 발명자
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(74) 대리인
리엔목특허법인

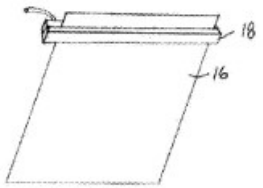
전체 청구항 수 : 총 41 항

(54) 발명의 명칭 **조류 바이오매스의 생산 및 수거를 위한 고정화 조류의 사용 방법 및 제품**

(57) 요 약

이산화탄소 및 광의 공급원에 대한 접근을 제공하는 기상 환경 내의 지지체 상에서의 고정화된 조류의 성장, 및 후속 수거 및 바이오매스 가공을 위한 조성물, 용품, 장치, 방법 및 시스템이 제공된다.

대 표 도 - 5c2



Instituto Mexicano de la Propiedad Industrial

(11) **MX 2013012628 A**

(12) **SOLICITUD de PATENTE**

(43) Fecha de publicación: 31/01/2014
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(21) Número de solicitud: 2013012628

(51) Int. Cl.: *F04F 5/54* (2006.01), *F04F 5/46* (2006.01)

(86) Número de solicitud PCT: US 12/35290
(87) Número de publicación PCT: WO 2012/149214 (01/11/2012)

(30) Prioridad(es): 29/04/2011 US 13/098,336

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(74) Representante:
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Paseo de los Tamarindos 400-A, Piso 9 CUAJIMALPA DE MORELOS Distrito Federal 05120 MX

(54) Título: **OPTIMIZACION DE CIRCULACION DE FLUIDO EN UN ESTANQUE DE CULTIVO DE ALGAS.**

(54) Title: **OPTIMIZATION OF CIRCULATION OF FLUID IN AN ALGAE CULTIVATION POND.**

(57) Resumen

Estanques de cultivo de algas que tienen la circulación de fluido optimizado para tales factores como consumo de energía reducido, depredadores/competidores reducidos, zonas muertas de flujo reducidas o eliminadas (es decir, regiones estancadas), y la producción de biomasa de algas incrementada, tal como para la producción de biocombustibles y otros productos a base de algas. Una primera parte inferior del estanque puede quedar bajo la zona de expansión. Una pared exterior puede formar un ángulo con la primera parte inferior del estanque de aproximadamente noventa a más de ciento sesenta grados. Una segunda parte inferior del estanque adyacente a la primera parte inferior del estanque puede tener una elevación de terreno aproximadamente consistente, que corresponde aproximadamente a una elevación del terreno más inferior de la primera parte inferior del estanque. Adicionalmente, la segunda parte inferior del estanque puede extenderse hacia afuera de la primera parte inferior del estanque. La aleta en la zona de expansión puede extenderse hasta un punto por arriba de la segunda parte inferior del estanque.

(57) Abstract

Algae cultivation ponds having the circulation of fluid optimized for such factors as decreased energy consumption, decreased predators/competitors, decreased or eliminated flow deadzones (i.e. stagnant regions), and increased algae biomass production, such as for the production of biofuels and other algae-based products. A first pond bottom may underlie the expansion zone. An exterior wall may form an angle with the first pond bottom of approximately ninety to greater than one-hundred-sixty degrees. A second pond bottom adjacent to the first pond bottom may have an approximately consistent ground elevation, approximately matching a lowermost ground elevation of the first pond bottom. Additionally, the second pond bottom may extend outward from the first pond bottom. The vane in the expansion zone may extend to a point above the second pond bottom.

US008642326B1

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

(10) **Patent No.: US 8,642,326 B1**
(45) **Date of Patent: Feb. 4, 2014**

(54) **SYSTEM FOR THE PRODUCTION AND HARVESTING OF ALGAE**

(76) Inventors: **Alan W. Schaefer**, Ste. Genevieve, MO (US); **Brandon D. Cabot**, Ste. Genevieve, MO (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 559 days.

(21) Appl. No.: **12/874,751**

(22) Filed: **Sep. 2, 2010**

Related U.S. Application Data

(60) Provisional application No. 61/239,306, filed on Sep. 2, 2009.

(51) **Int. Cl.**

C12M 1/00	(2006.01)
C12M 3/00	(2006.01)
C12N 1/12	(2006.01)
A01G 7/00	(2006.01)
A01H 13/00	(2006.01)

(52) **U.S. Cl.**
USPC **435/292.1**; 47/1.4; 435/257.1; 435/283.1; 435/289.1

(58) **Field of Classification Search**
USPC 435/257.1, 283.1–309.4; 47/1.4
See application file for complete search history.

(56) **References Cited**

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2006/0257295 A1 * 11/2006 Chen et al. 422/139
2010/0190227 A1 * 7/2010 Barth et al. 435/168

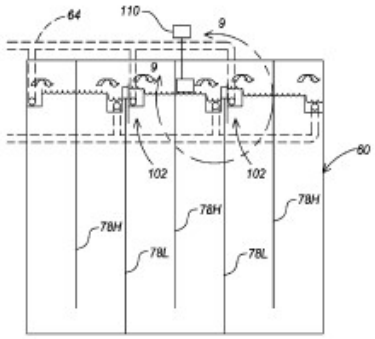
* cited by examiner

Primary Examiner — Nathan Bowers
Assistant Examiner — Lydia Edwards
(74) *Attorney, Agent, or Firm* — Grace J. Fishel

(57) **ABSTRACT**

A system for the production and harvesting of algae including one or more of the following components: A turbulator for dissolving carbon dioxide in water to form an algae growth media, a photobioreactor having a serpentine flow path for the algae growth media through spaced apart high and low baffles with an associated light source, a dewatering device for the algae slurry harvested from the photobioreactor, a turbulator for breaking up the cells in the algae sludge coming off the dewatering device, a cooker for cooking the broken up algae cells under pressure and a settling tank for separating the cooked cells into oil, spent media and biomass fractions.

16 Claims, 12 Drawing Sheets



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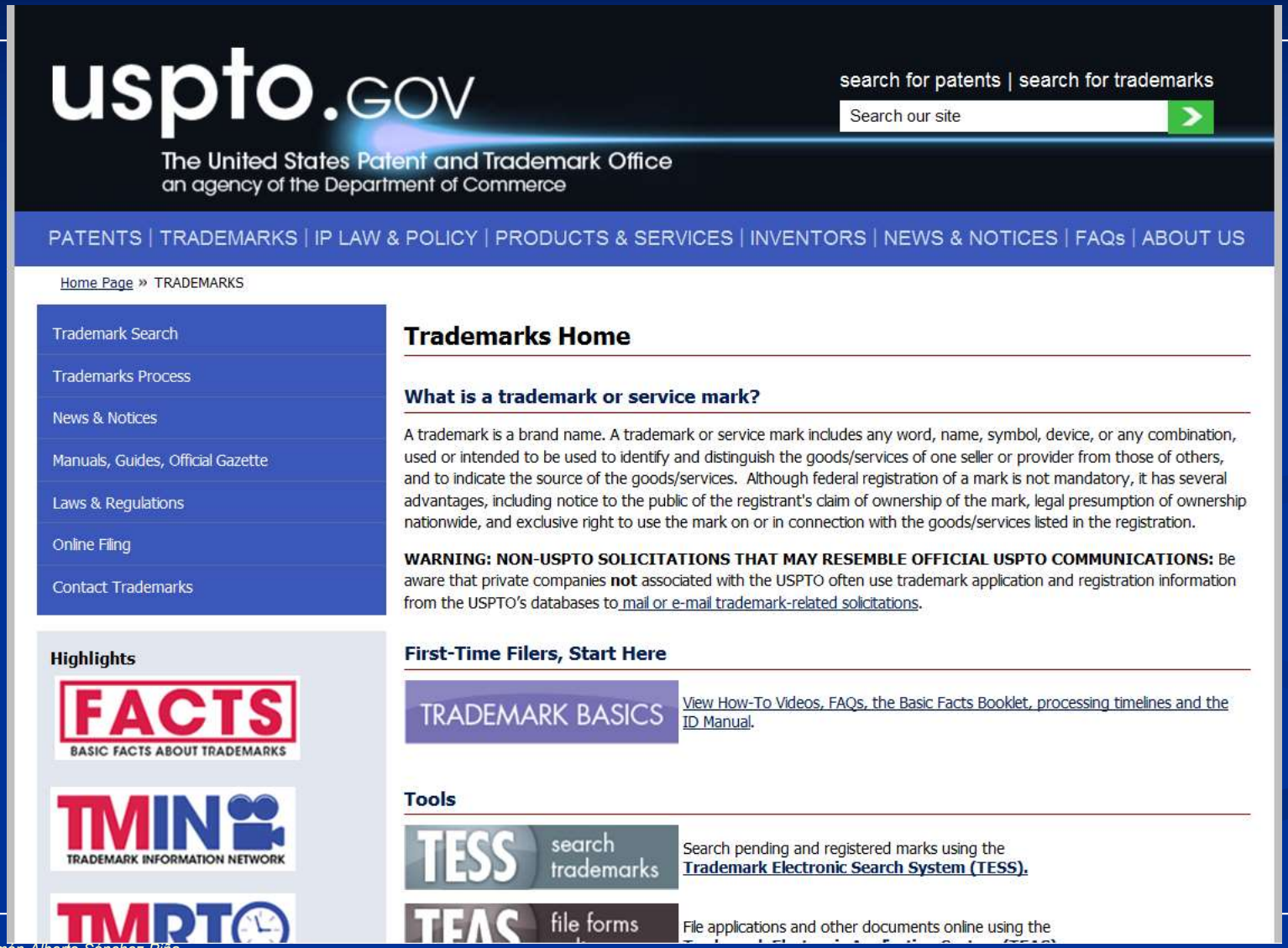

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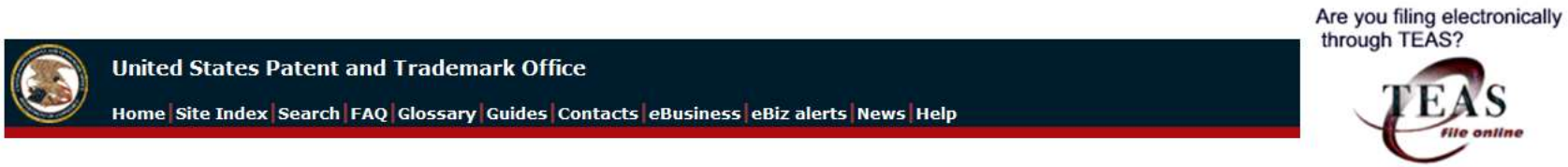

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AlgaeFuel

Word Mark	**ALGAEFUEL**
Goods and Services	(ABANDONED) IC 004. US 001 006 015. G & S: Renewable fuels. FIRST USE: 20060518. FIRST USE IN COMMERCE: 20060602
Standard Characters Claimed	
Mark Drawing Code	(4) STANDARD CHARACTER MARK
Serial Number	77170710
Filing Date	May 2, 2007
Filing Basis	1A
Original Filing Basis	1A
Owner	(APPLICANT) Brendel, Alex J. INDIVIDUAL UNITED STATES 249 Western Hills Drive Pleasant Hill CALIFORNIA 94523
Type of Mark	TRADEMARK
Register	PRINCIPAL
Live/Dead Indicator	DEAD
Abandonment Date	February 22, 2008

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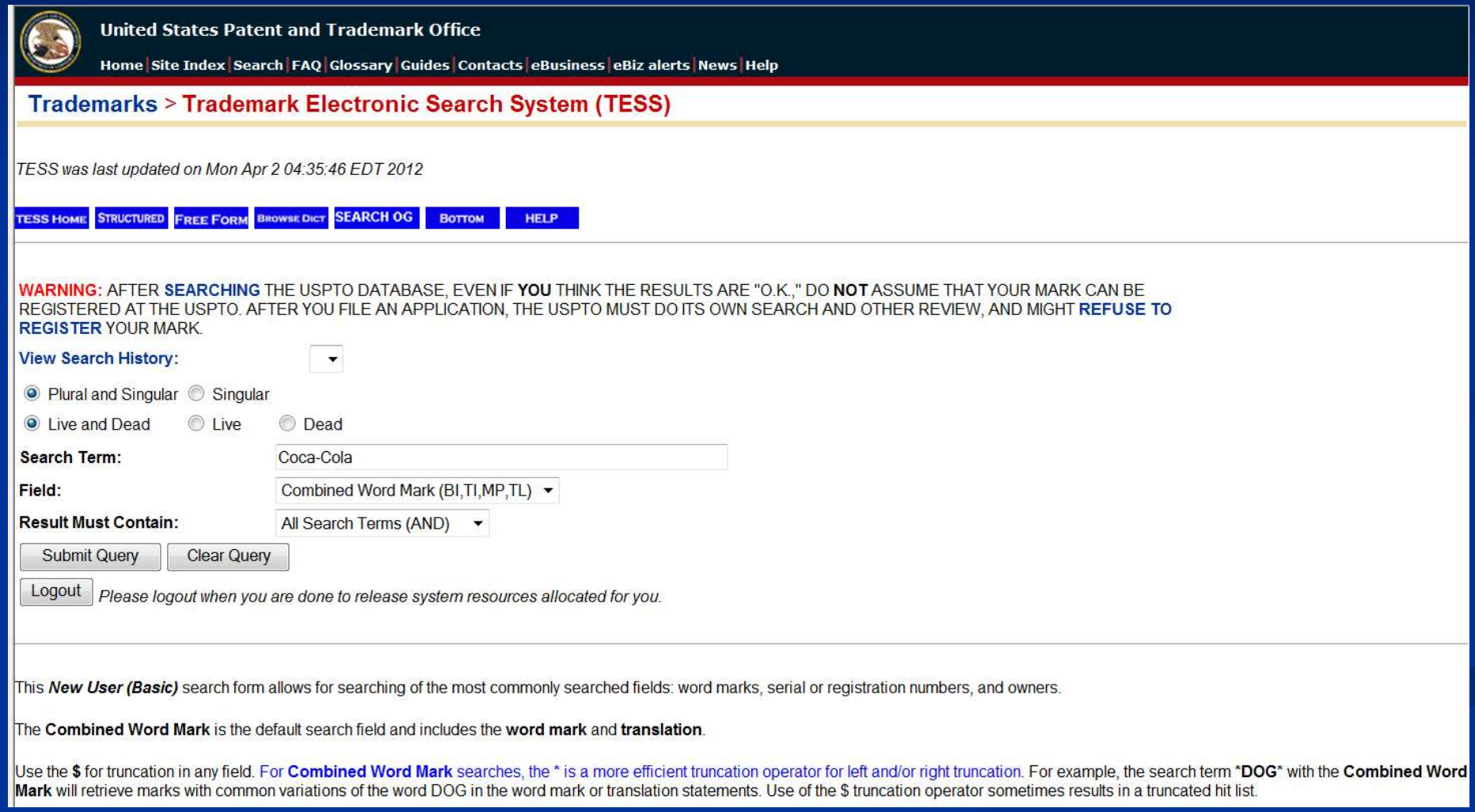

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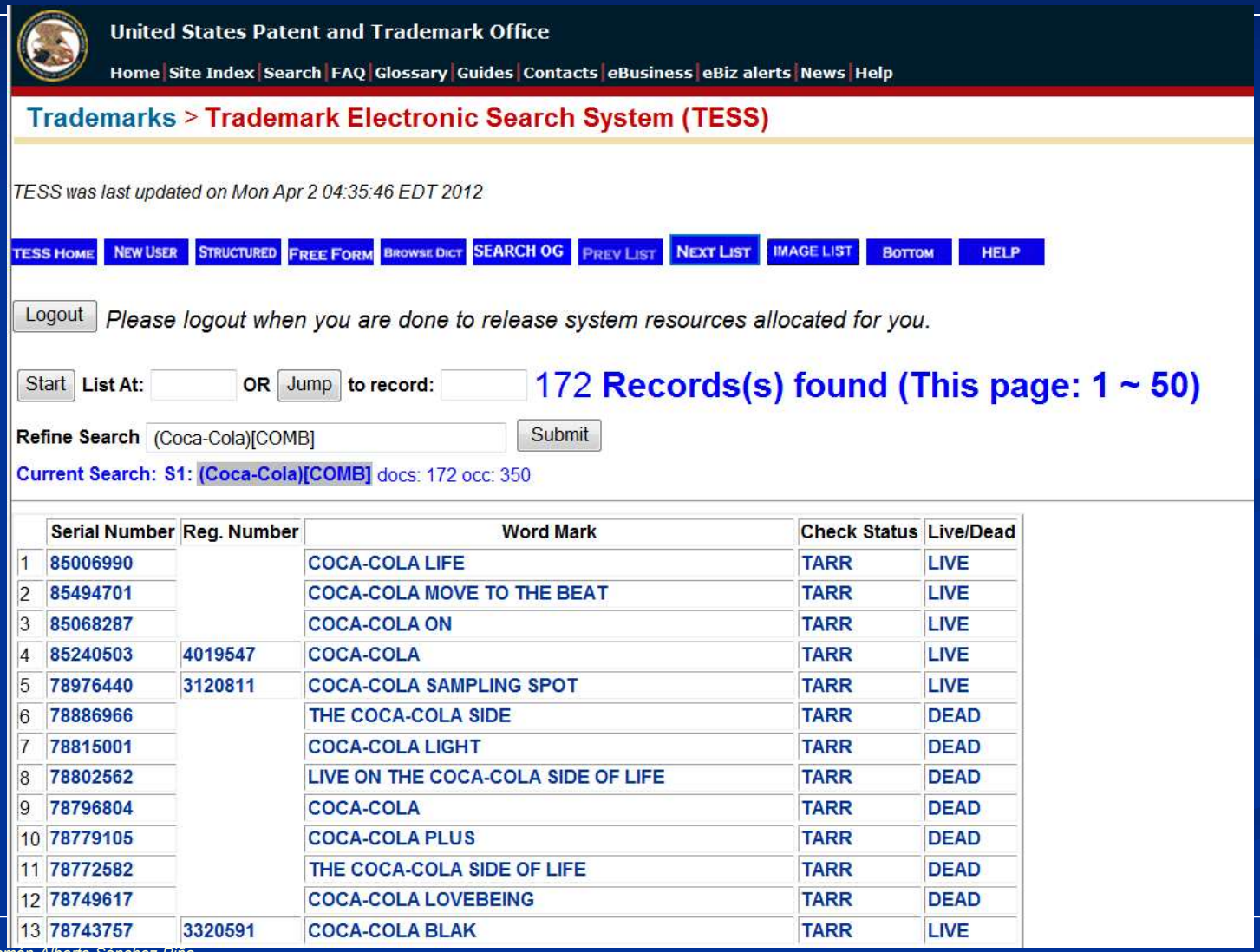

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Current Search: S1: (Coca-Cola)[COMB] docs: 172 occ: 350

	Serial Number	Reg. Number	Word Mark	Check Status	Live/Dead
1	85006990		COCA-COLA LIFE	TARR	LIVE
2	85494701		COCA-COLA MOVE TO THE BEAT	TARR	LIVE
3	85068287		COCA-COLA ON	TARR	LIVE
4	85240503	4019547	COCA-COLA	TARR	LIVE
5	78976440	3120811	COCA-COLA SAMPLING SPOT	TARR	LIVE
6	78886966		THE COCA-COLA SIDE	TARR	DEAD
7	78815001		COCA-COLA LIGHT	TARR	DEAD
8	78802562		LIVE ON THE COCA-COLA SIDE OF LIFE	TARR	DEAD
9	78796804		COCA-COLA	TARR	DEAD
10	78779105		COCA-COLA PLUS	TARR	DEAD
11	78772582		THE COCA-COLA SIDE OF LIFE	TARR	DEAD
12	78749617		COCA-COLA LOVEBEING	TARR	DEAD
13	78743757	3320591	COCA-COLA BLAK	TARR	LIVE

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COCA-COLA ZERO

Word Mark	**COCA-COLA** ZERO
Goods and Services	IC 032. US 045 046 048. G & S: Beverages, namely soft drinks; syrups and concentrates for the making of the same. FIRST USE: 20050613. FIRST USE IN COMMERCE: 20050613
Standard Characters Claimed	
Mark Drawing Code	(4) STANDARD CHARACTER MARK
Serial Number	78580598
Filing Date	March 4, 2005
Filing Basis	1A
Original Filing Basis	1B
Published for Opposition	April 17, 2007
Owner	(APPLICANT) The Coca-Cola Company CORPORATION DELAWARE One Coca-Cola Plaza Atlanta GEORGIA 30313
Attorney of Record	Paula Guibault
Prior Registrations	0238145;0238146;AND OTHERS
Type of Mark	TRADEMARK
Register	PRINCIPAL-2(F)-IN PART
Live/Dead Indicator	LIVE
Distinctiveness Limitation Statement	As to "ZERO"

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