Patent Law & Nanotechnology: An Examiner's Perspective

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Presentation Overview

- What is a Patent?
- Parts and Form of a Patent application
- Standards for Evaluating Applications
- Writing Disclosures
- Identifying Patentable Subject Matter: Searching and 37 CFR §1.56 *et seq*
- Protecting IP: Parts and Forms

What is a patent?

- A government-granted monopoly for a limited time in exchange for public disclosure (e.g. publishing) of an invention
- The right to exclude - the *exclusive* right to *prevent* <u>others</u> from:
  - Making
  - Using
  - Selling or offering for sale
  - Importing”
- “The right to sue”
- Utility patent (vs. plant or design)

What can be patented?

- In the United States: 35 USC §101:
  - "Any new and useful **process**, **machine**, **manufacture**, or **composition of matter**, or any new and useful improvement thereof"
  - US Supreme Court ('USSC') determines scope and has added:
  - Genes and living organisms (GMOs)
  - Computer software and Business methods
  - Surgical methods & methods of treating diseases
- In Europe / Japan / China: the scope of USC 101 but not most or all of the items that USSC has added

What cannot be patented?

- In United States:
  - Physical phenomena (such as electromagnetic signals*)
  - Naturally occurring minerals, plants, or animals
  - Laws of nature (e.g. $E=mc^2$)
  - Abstract ideas (computer software per se*)
- In other countries
  - All of the above, methods that involve mental steps, methods of playing games, etc; it varies by country/WIPO rules

Who can apply for a patent?

- In the United States:
  - The inventors must apply for the patent
  - Inventors can assign rights to a corporation
  - Corporate entities cannot directly apply for a patent
- WIPO / Europe:
  - Corporate entities may directly apply for a patent
  - Inventors only need to be listed

Where to submit an application?

- National offices:
  - United States Patent & Trademark Office (USPTO)
  - Japanese Patent Office (JPO)
- Regional Offices:
  - European Patent Office (EPO)
  - ARIPO
- World Intellectual Property Organization (WIPO)
  - Patent Cooperation Treaty (PCT)

Are patent applications published?

- Every country publishes the patent application by 18 months after filing
- In the United States, if an application is only going to be domestically, then a special form may be filled out and sent to the USPTO to request that the application not be published

Other types of patent application

- United States
  - Provisional: expires after one year, specification only
  - Continuation: child application, same specification, new claims, choice of applicant to file
  - Divisional: child application, same specification, split claims (different inventions), Office forces applicant to drop claims or file separately
  - Continuation-in-Part: child application, but adds new material – effective filing date becomes date of added material (usually has same effective end date)
  - Child applications must be filed before parent case issues
- International
  - PCT – global, unified *application* – WIPO does not issue, but these are treated differently once filed in each designated country

Filing dates and priority

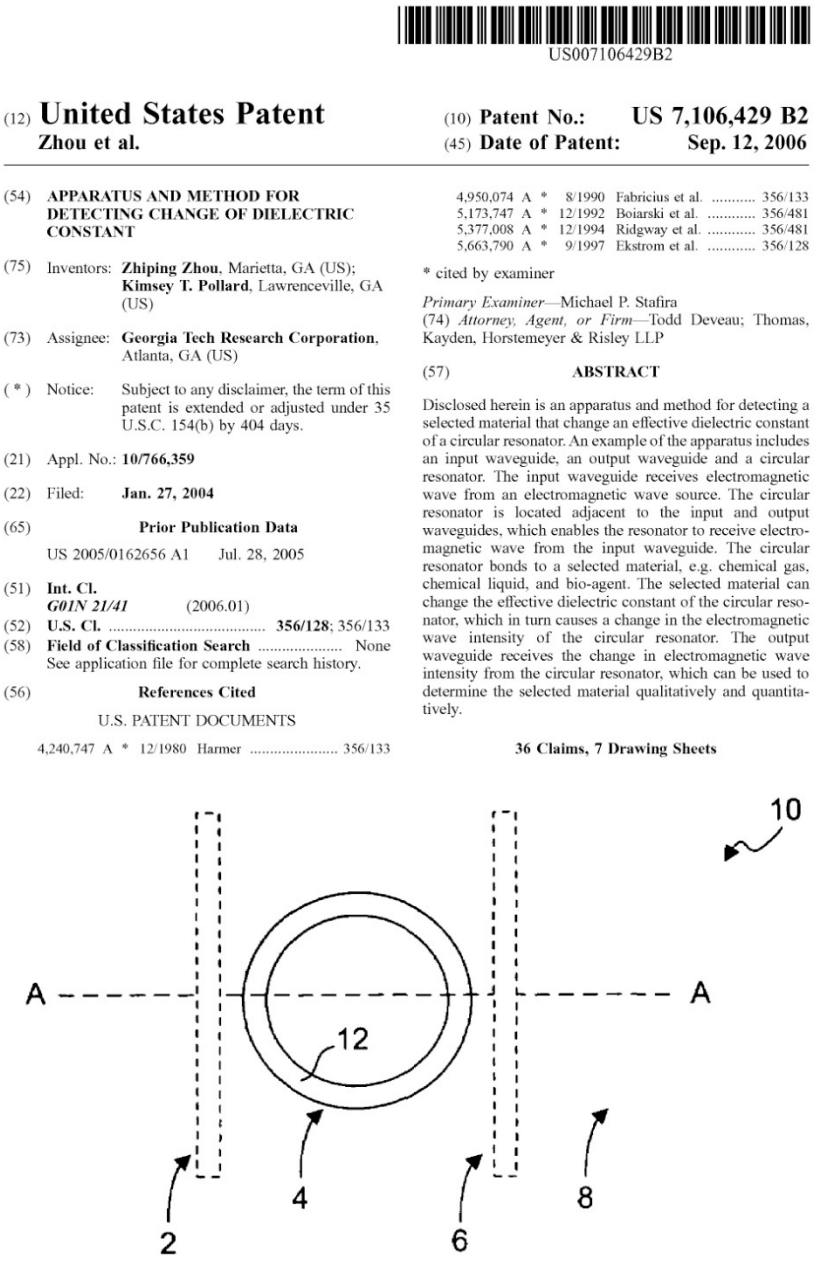
- “Foreign priority” - Filing a patent application in one country gives the inventor one year to file the application in another country where it is treated as having been filed on that same date (Paris Convention)
- “Domestic priority” – Filing a continuation, divisional, or CIP - these receive the effective filing date of their parent applications
- PCT applications – after filing, have 18-30 months to file in designated countries and receive foreign priority – when filed as a National Stage application they are treated as US applications

What are the key differences between US and foreign patents?

- Three key ones to remember
  - First-to-file vs. first-to-invent
  - One year grace period in US law does not exist overseas – use it & lose it – publish first-apply later only works in the US
  - Day a paper is published or talk is given is the effective date it is available in other countries
  - Patentable subject matter is more narrow in other countries

What are the parts of a patent application?

- Fee & Oath
- Specification (Written Description)
  - Claims
- Drawing
- 35 USC §111



US007106429B2

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

(10) **Patent No.: US 7,106,429 B2**
(45) **Date of Patent: Sep. 12, 2006**

(54) **APPARATUS AND METHOD FOR DETECTING CHANGE OF DIELECTRIC CONSTANT**

(75) Inventors: **Zhiping Zhou**, Marietta, GA (US); **Kimsey T. Pollard**, Lawrenceville, GA (US)

(73) Assignee: **Georgia Tech Research Corporation**, Atlanta, GA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 404 days.

(21) Appl. No.: **10/766,359**

(22) Filed: **Jan. 27, 2004**

(65) **Prior Publication Data**

US 2005/0162656 A1 Jul. 28, 2005

(51) **Int. Cl.**
G01N 21/41 (2006.01)

(52) **U.S. Cl.** **356/128**; 356/133

(58) **Field of Classification Search** ..... None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,240,747 A * 12/1980 Harmer 356/133
4,950,074 A * 8/1990 Fabricius et al. 356/133
5,173,747 A * 12/1992 Boiarski et al. 356/481
5,377,008 A * 12/1994 Ridgway et al. 356/481
5,663,790 A * 9/1997 Ekstrom et al. 356/128

* cited by examiner

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(57) **ABSTRACT**

Disclosed herein is an apparatus and method for detecting a selected material that change an effective dielectric constant of a circular resonator. An example of the apparatus includes an input waveguide, an output waveguide and a circular resonator. The input waveguide receives electromagnetic wave from an electromagnetic wave source. The circular resonator is located adjacent to the input and output waveguides, which enables the resonator to receive electromagnetic wave from the input waveguide. The circular resonator bonds to a selected material, e.g. chemical gas, chemical liquid, and bio-agent. The selected material can change the effective dielectric constant of the circular resonator, which in turn causes a change in the electromagnetic wave intensity of the circular resonator. The output waveguide receives the change in electromagnetic wave intensity from the circular resonator, which can be used to determine the selected material qualitatively and quantitatively.

36 Claims, 7 Drawing Sheets

Foreign filings vs. PCT Applications – pros and cons

- Direct filing of applications in specific country
  - Advantages: Speed, limit coverage to important country
  - Disadvantages: Translations required immediately, need local / in-country representative immediately
- PCT
  - Advantages: one application, no translations immediately required
  - Disadvantages: Process is slower, no provisional rights, more expensive; still require in-country counsel for each country application as well as PCT-qualified agent

What are the requirements for a written description? (35 USC §112)

- It must explain how to make and/or use the invention
- In full, clear, concise, and exact terms
- In a manner so that a person having ordinary skill in the art (PHOSITA) can implement it
- While including the best mode to carry out the invention
- Ends with **claims** which clearly point out and distinctly claim the desired subject matter

What are the drawing requirements?

- If the invention can be illustrated by a drawing, it should have at least one
- Drawings need to be formal
  - No handwriting
  - No sketches
- Drawings are not ‘formally’ reviewed by a draftsman, but rather by the examiner

What should the specification contain?

- Title and Abstract
- Background of the invention – anything listed here is prior art and will be used as a reference against the claims filed
- Brief summary of the invention
- Brief description of the drawings
- Detailed description of the invention
- Claims

How is the scope of a patent determined?

- “The name of the game is the claim”
- Wording in the claims determines the scope of the patent
- Defining any unique terms or commonly used terms that may need a specific meaning

Which standards does an examiner utilize to evaluate claims?

- 35 USC §101: claims must be patentable subject matter
- 35 USC §112: claims must be **fully supported** in specification & **clearly written**
- 35 USC §102: claims must be **novel**
- 35 USC §103: claim must be **non-obvious**

What is section 102 novelty?

- Has it been done before?
- Key points:
  - 1. Patented or published patent application
  - 2. Public use or sale, publication or presentation more than a year prior to filing by the inventor (“one year bar” “one year grace period”)
  - 3. Publication by another before the filing date

What is Section 103 Obviousness?

- "Obvious to **one of ordinary skill in the art** *at the time the invention was made*"
- Key: examiners are *assumed* to be at or above the ordinary level of skill in the art
- Key: invention is viewed as of the filing date – only publications, etc, that were available on or before that date may be used
- Prior patents / applications by the same company, unless *published* one year or more before filing, cannot be used for obviousness determinations

What is section 103 obviousness?

- Graham v. Deere (1966) – 3 factors:
  - Scope and content of the prior art;
  - Differences between the claimed invention and the prior art; and
  - The level of ordinary skill in the prior art

    *Secondary considerations (commercial success; long-felt need; failure of others)
- KSR v. Teleflex (2007)
  - Reaffirmed two key points:
    - Combination or substitution of various elements that produces predictable or similar results is probably obvious
    - PHOSITA may use judgment, common sense, etc, as sources of rationale for obviousness rejection – must still be justified

The Examiner's Role

- Examiner makes factual and legal determinations concerning patentability
- Examiners work under a quota system with a fixed number of hours per case – less hours at higher pay grades and very short amounts of time for simple art areas (e.g. screws, nails) vs. complex areas (nanotechnology, computer graphics, etc) which get the most time
- The junior examiner works independently but has work reviewed by (supervisory) primary examiners to ensure determinations are valid

Examination Process

- Application is read and checked for general consistency (drawings mentioned in specification, etc)
- Claims are reviewed
- Claims are evaluated for restriction; if necessary, examination stops until applicant elects group of claims

Examination Process

- Restriction practice
  - Different inventions will be split between different applications
- Original or Amended Claims are reviewed for compliance with 35 USC 101, 112, 102, 103

Examiner's Perspective on Claims

- Very broad claims will be rejected easily
- Claims should be written to be very specific
- Otherwise there will be multiple rounds of amendment – both expensive and time consuming

How does this actually apply? Great example

- The invention claimed is:

  1. An apparatus for detecting a selected material that changes an effective dielectric constant of a circular resonator, the apparatus comprising: an input waveguide being capable of receiving electromagnetic wave; an output waveguide; and a circular resonator located adjacent to the input and output such that the electromagnetic wave is coupled in and out of the circular resonator, the resonator being capable of bonding to the selected material such that the selected material changes the power of the electromagnetic wave in the circular resonator, wherein the output waveguide receives the change in the power of the electromagnetic wave in the circular resonator. ‘

- This patent issued with no amendment from the first action

University Perspective

- IP Licensing driven by Bayh-Dole Act in 1980
- Universities can retain title to federally funded research
- Universities must actively pursue patent and attempt to commercialize research
- University decisions to pursue patents are based on IP disclosures filed by researchers

University Perspective

- University Technology Transfer Office evaluates IP disclosure documents to determine what is further pursued as a patent
- Hard for the Office to evaluate scientific potential
- Evaluate applications based on BOTH business perspective and scientific merit
- Researchers need to make sure to emphasize commercialization and revenue potential in their disclosure documents

USPTO search site

- Image File Wrapper technology
- All items in file wrapper are prior art
- Public Full-image database
- http://www.uspto.gov/patft
- Public PAIR
- http://portal.uspto.gov/external/portal/pair

How to identify Patentable Subject Matter

- Read through patent documents and published patent applications
- Read through current papers in the field
- When reviewing documents, need to make a note what documents were reviewed
- Compare current project with published material

Researcher's Perspective

- Need to identify patentable subject matter
- Desire to protect invention
- Decision on how to proceed:
  - Trade secret
  - Patent

Searching for Patentable Subject Matter

- Patents and applications use totally different language than scientific literature
- Key to patent scope is the claimed invention
- Wording can be very different
- Need to review large numbers of patents or find another researcher or searcher that has experience to find out *key terms* in the patent literature
- Key importance is finding someone with experience in this field

Process after Identifying Potential Patentable Subject Matter

- Review the literature
- Write the disclosure document
  - Summarize invention first
  - Make it read well like a story of how the technology evolved
  - Do not include too much background information

Review of Nanotechnology-specific patent / IP issues

- Crowded field – carbon nanotubes
- Patent thicket
- Specific examples

Conclusions

- What is a patent
- The parts of a patent
- US vs. foreign filing
- Decisions driving filing patents
- Identifying Patentable Subject Matter
- Nano-technology specific itemss