



# Patent law fundamentals for innovators in the ceramic and glass industry

By Steve Ritchey

Part one of a two-part series presents the importance of patents to companies and the requirements that must be met before patents are granted.

Patents are an important class of asset for any company. For a start-up company, its patent portfolio may be its most important asset. Despite their importance, patents and the surrounding law may not be well understood by researchers and management. Therefore, they risk making decisions or taking actions that could negatively impact their ability to pursue and obtain patent protection for their inventions. The best way for a company to avoid costly mistakes at a critical juncture is to become better informed about the patent process and work closely with a patent attorney at all stages of an invention.

Because of the significant changes wrought by the recent America Invents Act (AIA), it is more important than ever to take proactive, forward-looking measures to position innovations properly for the patent process. This article sets forth some fundamental principles regarding patents and the requirements for obtaining patents, describes the types of patents relevant to the ceramic and glass industry, and briefly discusses the significant changes in patent law from the AIA.

## What is a patent?

In general, a patent is a grant of some privilege, property, or authority made by a government to one or more persons. In the United States, Article I, Section 8, Clause 8 of the Constitution provides Congress the power to “promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.”

The patent and copyright clause of the Constitution was evidently uncontroversial, because there is no record of debate on the topic by the framers of the Constitution. The first Patent Act was enacted in 1790. Thomas Jefferson, as the first Secretary of the Department of State, had the primary responsibility for administering the statute, including examination procedures. The present Patent Act was enacted in 1952 and has been amended numerous times over the decades, including the recent Leahy–Smith America Invents Act of 2011. As

established in Title 35 of the United States Code, it provides that a patent grants to the owner,

... the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States or importing the invention into the United States, and if the invention is a process, of the right to exclude others from using, offering for sale or selling throughout the United States, or importing into the United States, products made by that process ...

This excerpt from the law sets forth what may be the most misunderstood aspect of patent law. A patentee has the right only to exclude others from practicing the patented invention. A patentee does not have the right to practice the patented invention. The comic illustrates this concept.

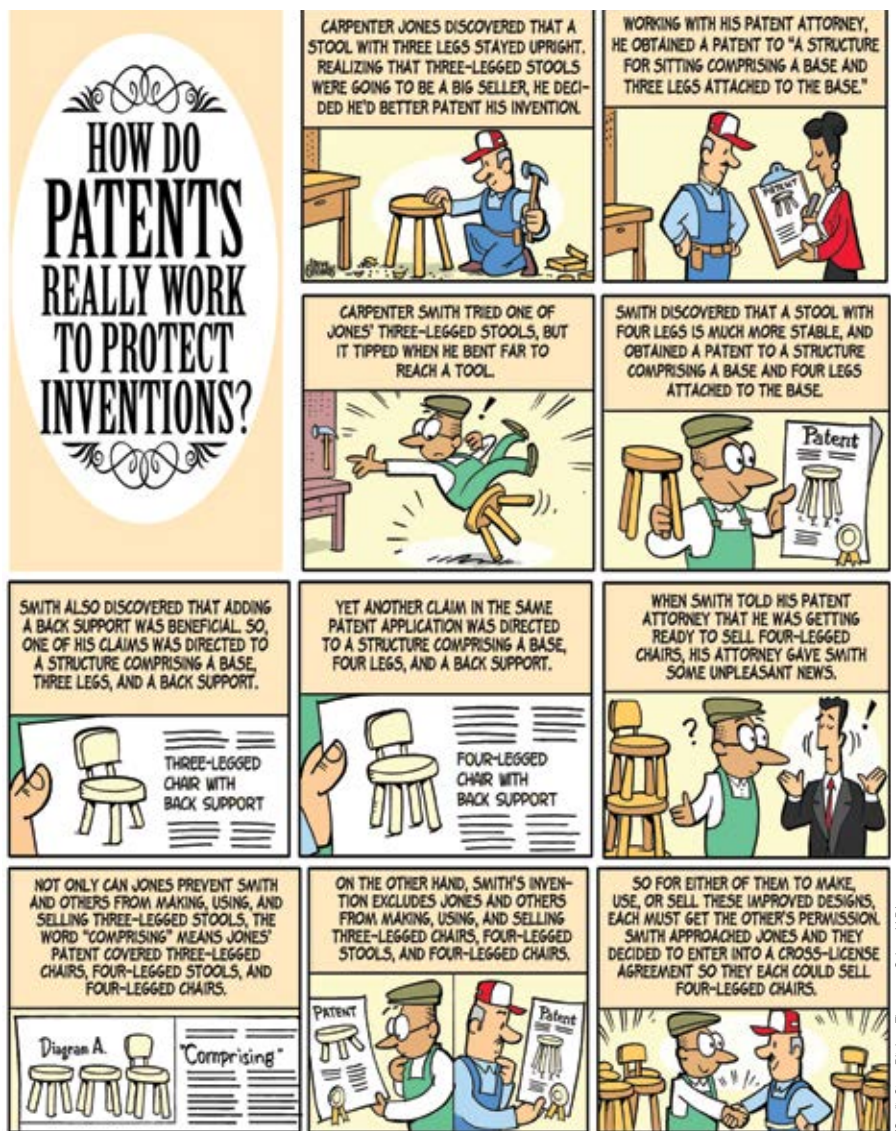
### Types of patents

There are two types of patents that are relevant to the ceramics industry—the utility patent and the design patent.

A utility patent may be directed to a new and useful process, machine, manufacture, or composition of matter. Its term begins with the patent grant and ends 20 years from the earlier of the application's filing date or priority date. Recent utility patents issued in the ceramics field include a nanotube array light-emitting diode,<sup>1</sup> a silicon-on-insulator wafer in which the upper portion has a trapezoidal cross-section and the lower portion has a curved outer peripheral edge,<sup>2</sup> and a particular boroaluminosilicate glass composition for making dinner plates by a fusion draw process.<sup>3</sup>

In contrast, a design patent is directed to a new ornamental design for an object of manufacture and has a term of 14 years from issuance. Examples could be new designs for a coffee cup or bathtub.

Utility and design patents are not mutually exclusive. Therefore, depending upon the circumstances, one may obtain both types of patent protection on a particular object of manufacture. For example, the composition of a white glass-ceramic capable of withstanding a



thermal shock of up to 450°C—which was originally developed for the US ballistic missile program—would be patentable along with the design of cookware made from the material.

The increasing importance of patents may be seen in the fairly consistent growth in the number of patents issued since the creation of the Federal Circuit Court of Appeals in 1983 (Figure 1). The Federal Circuit is the exclusive court for patent appeals and was created, in large part, to develop more uniform patent law jurisprudence than what had developed among the various regional circuit courts of appeals.

### Parts of a patent

A patent contains several parts. The front page contains a wealth of information about the patent, as shown in Figure 2.

Immediately after the front page are the drawings, which may be images of

one or more aspects of the invention or may include other relevant information, such as graphs of experimental data. The section often referred to as the “specification,” follows the drawings and may include a background of the invention, a brief summary of the invention, a brief description of the drawings, and a detailed description of the invention, which also may disclose experiments.

The patent ends with its most important aspect: the claims, which define the scope of the invention and face the most scrutiny by the Patent Office and during patent infringement actions. As noted by the Supreme Court in 1892, “[t]he specification and claims of a patent, particularly if the invention be at all complicated, constitute one of the most difficult legal instruments to draw with accuracy.”<sup>14</sup> As such, a precise use of language and considerable skill is required to draft claims that define a patentable invention over the prior art while still

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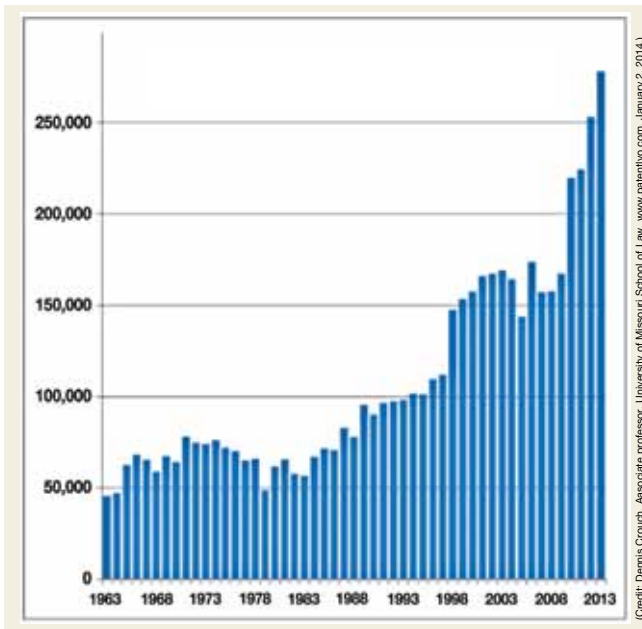


Figure 1. Utility patents granted per year.

embracing all the possible variations of the fundamental concepts of the invention so that the inventor/owner may obtain the full measure of protection to which he or she is entitled.

## Requirements to obtain a patent

To obtain a patent, several statutory requirements must be satisfied. As indicated above, the claims are of the utmost importance. When the statute refers to an “invention,” it means the invention as claimed or the claimed invention. A threshold requirement is that the patent must be directed to patentable subject matter.<sup>5</sup> Patentable subject matter includes a process, machine, manufacture, or composition of matter, but does not include “phenomena of nature, though just discovered, mental processes, and abstract intellectual concepts, as they are the basic tools of scientific and technological work.”<sup>6</sup> Once the threshold patentable subject matter inquiry is addressed, one may turn to the four primary statutory requirements: utility, novelty, nonobviousness, and adequate disclosure.

## Utility

The invention must be useful or have utility.<sup>7</sup> Satisfying the utility requirement is typically not an issue. The invention need not work better than earlier technologies. Simply put, the application

must disclose a use that is presently available to benefit the public (i.e., it cannot prove useful at some future date after future research).

## Novelty

The claimed invention must be novel or new, which generally means it must not have been available to the public before the effective filing date of the claimed invention. Although there is a one-year grace period for earlier disclosures made by the inventor and

some other exceptions, the Patent Act defines prior art to a claimed invention as:

- US and foreign patents, printed publications, public uses, and sales before the effective filing date of the claimed invention; and
- US patents and published US patent applications having an effective filing date before that of the claimed invention.<sup>8</sup>

This is the “prior art” to which a claimed invention is compared for novelty and obviousness (discussed below). The claimed invention is not novel or is “anticipated” if a single prior art reference discloses all the claimed aspects of the invention.

Whether a claim is novel is usually a straightforward, objective determination—a single prior art reference either discloses all the aspects of a claim or it does not. That said, there are complications, such as “inherent” anticipation, in which a particular claim element is not expressly disclosed in a reference but it is necessarily present if the teachings of the prior art reference are followed. A federal circuit case from 1985, *Titanium Metals*, offers an example.<sup>9</sup> The case involved a patent application for a titanium alloy that contained various ranges of nickel, molybdenum, iron, and titanium and was “characterized by good corrosion resistance in hot brine environments.” However, the court rec-

ognized a prior art reference—an article written by two Russian scientists—that disclosed a particular alloy falling within the patent’s claimed ranges. Although the article did not disclose any corrosion resistance properties, it barred the granting of a patent because corrosion resistance was an inherent property of the alloy—regardless of whether the Russian scientists knew that.

Moreover, a determination as to whether a particular reference constitutes prior art can be complicated. As will be discussed in greater detail in a future article, the AIA significantly changed the provisions for determining whether a particular reference constitutes prior art to a patent application filed on or after March 16, 2013.

## Obviousness

The invention must not be obvious over the prior art.<sup>10</sup> Unlike novelty, the consideration of obviousness is not limited to a single prior art reference. Instead, obviousness is judged from the point of view of a person of ordinary skill in the art, who is deemed to be aware of all the relevant prior art. Obviousness is the USPTO’s most typical basis for the rejection of claims when examining a patent application. It is relatively rare that all the claims of a patent are defeated on the basis of novelty—typically no single prior art reference exists that discloses all the elements of a claimed invention. However, the Office often finds all the claim elements in a combination of prior art references.

The determination of obviousness is largely subjective and requires determining whether the differences between the claimed invention and one or a combination of prior art references is such that the claimed invention, as a whole, would have been obvious to a person of ordinary skill in the art at the time the invention was made.

Although primarily a subjective determination, objective evidence often referred to as “secondary considerations” can support a finding of nonobviousness. Examples of secondary considerations include the invention’s commercial success, long-felt but unresolved needs, the failure of others, skepticism by experts,



US007921910B2

**United States Patent**  
**Wilson et al.**

(10) **Patent No.:** **US 7,921,910 B2**  
(45) **Date of Patent:** **Apr. 12, 2011**

**First name inventor** → (12) **Wilson et al.**

**Title** → (54) **TAGGED PROPPING AGENTS AND RELATED METHODS**

**Inventors** → (75) Inventors: **Brett A. Wilson**, Lafayette, LA (US); **Robert Duencel**, Southlake, TX (US); **Thomas C. Palamara**, Eufaula, AL (US)

**Patent owner** → (73) Assignee: **Carbo Ceramics Inc.**, Houston, TX (US)

**Modifications to term of the patent** → (\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 246 days.

**Application number** → (21) Appl. No.: **11/667,324**

**Filing date and related applications** → (22) PCT Filed: **Mar. 22, 2005**  
(86) PCT No.: **PCT/US2005/009511**  
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**E21B 49/08** (2006.01)  
**E21B 47/00** (2006.01)  
**E21B 43/267** (2006.01)  
(52) **U.S. Cl.** ..... **166/250.12; 166/252.6; 166/280.2**  
(58) **Field of Classification Search** ..... None  
See application file for complete search history.

**References Cited**

**U.S. PATENT DOCUMENTS**

4,879,181 A	11/1989	Fitzgibbon
5,182,051 A *	1/1993	Bandy et al. .... 252/645
5,243,190 A	9/1993	Bandy et al.
6,691,780 B2	2/2004	Nguyen et al.
2003/0196799 A1	10/2003	Nguyen et al.
2004/0129923 A1	7/2004	Nguyen et al.
2004/0162224 A1	8/2004	Nguyen et al.

**FOREIGN PATENT DOCUMENTS**

EP 1 355 038 A1 10/2003

**OTHER PUBLICATIONS**

International Search Report for PCT/US05/009511, published by the International Bureau of WIPO on Jul. 5, 2005 under WO 2005/100746 A1.  
Office Action dated Jul. 10, 2009 for Chinese Application No. 20058005208.X, 6 pages.

\* cited by examiner

**Primary Examiner** — Zakiya W. Bates  
(74) **Attorney, Agent, or Firm** — Thompson Coburn LLP

**ABSTRACT**

A proppant composition comprises a non-radioactive, detectable tracer at least partially embedded in a ceramic composition. The composition may be prepared by agglomerating granules of the ceramic material and granules of the non-radioactive, detectable material to produce the particle by compression. Backflow of proppants in a fractured subterranean formation into which a plurality of particles of the proppant composition have been introduced may be tracked by analyzing a sample of the backflow by detecting for presence of the tracer in the sample.

**22 Claims, 1 Drawing Sheet**

Figure 2. Front page of a patent application.

praise by others, teaching away by others (e.g., a prior art reference that claims an aspect of your invention would be, for example, undesirable, ineffective, counterproductive, or impossible), recognition of a problem, and copying of the invention by competitors.

In 2007, the US Supreme Court’s *KSR v. Teleflex* decision significantly changed how the USPTO and the courts analyze the question of obviousness.<sup>11</sup> In particular, the Court rejected the rigid analysis that had developed in lower courts since its seminal *Graham v. John Deere* decision in 1966 in favor of a flexible inquiry.<sup>12</sup> The *KSR* decision is important from a legal point of view, and it provides a good illustration of an obviousness analysis involving the combination of multiple prior art references.

In *KSR*, the claim was to a position-adjustable vehicle pedal having three elements: the pedal assembly has a fixed pivot point; an electronic pedal-position sensor is on the pedal assembly itself; and the sensor is attached to the fixed pivot point. The primary prior art reference disclosed a support structure for an adjustable pedal assembly in which one

pivot point stays fixed, thereby satisfying the first claim element.

According to the Court, the question “was whether a pedal designer of ordinary skill, facing the wide range of needs created by developments in the field of endeavor, would have seen a benefit to upgrading [the primary prior art design] with a sensor.” The answer, of course, was yes. At the relevant time, the marketplace had created strong incentive to convert mechanical pedals to those using electronic sensors. Therefore, starting with the primary reference design, the question for a pedal designer “was where to attach the sensor. The consequent legal question, then, is whether a pedal designer of ordinary skill starting with [the primary reference design] would have found it obvious to put the sensor on a fixed pivot point.”

Turning to the other prior art references, the Court determined a second reference taught the benefit of putting the sensor on the pedal assembly instead of the engine (i.e., the second claim limitation). A third reference taught that the sensor should not be on the pedal’s footpad but instead on a

nonmoving part of the pedal support structure to avoid motion in the sensor wires, which causes wire-chafing.

In view of the teachings about the sensor location and the fixed pivot point design of the primary references, the Court concluded that “[t]he most obvious nonmoving point on the structure from which a sensor can easily detect the pedal’s position is a pivot point.” Therefore, all three of the claim limitations were found to be obvious in view of the prior art. As a result, the claim was deemed invalid.

### Adequate disclosure

Lastly, the patent application must satisfy three distinct but related requirements: written description; enablement; and best mode.<sup>13</sup> These three requirements are the minimum level of disclosure. A patent may, and often does, have disclosure that surpasses the statutory minimum. Failing to comply with these requirements will render the affected claims invalid. The AIA removed invalidity as the consequence of failing to disclose best mode. Importantly, adequate disclosure requirements are evalu-

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ated as of the effective filing date of the application, even if the issue does not come up until much later when a patent is the subject of litigation. The written description and enablement requirements tend to be issues for patents of chemical and biotech inventions and are usually not of concern for patents of mechanical and electrical inventions.

## Written description

The written description requirement promotes the progress of the useful arts by ensuring the patentee adequately describes the invention in the patent specification in exchange for the right to exclude others from practicing the invention for the duration of the patent's term. To satisfy the written description requirement, a patent specification must describe the claimed invention in sufficient detail that a person of ordinary skill in the art can reasonably conclude that the inventor "possessed" the claimed invention. Such possession is shown by describing the invention with all of its elements using descriptive means, including words, figures, diagrams, and formulas. For example, when considering a patent for a compound, the USPTO may look for a description incorporating chemical structures, physical and chemical properties, and functional characteristics coupled with a known or disclosed correlation between the function and structure, or some combination of such characteristics. As noted by the Federal Circuit, "[c]ompliance with the written description requirement is essentially a fact-based inquiry that will 'necessarily vary depending on the nature of the invention claimed.'"<sup>14</sup>

## Enablement

The enablement requirement is satisfied with a specification that discloses sufficient information to allow a person of ordinary skill in the art to make and use (or "practice") the invention without undue experimentation (see *Wands* factors for evaluating whether experimentation needed to practice an invention is undue). As with the written description requirement, the enablement requirement is part of the bargain of promoting science and the useful arts in exchange for a limited monopoly. However, the

## Wands factors for evaluating whether experimentation needed to practice an invention is undue

Wands factor	Analysis
Quantity of the experimentation	The less experimentation, the better. Considered in terms of time, effort, cost, etc., in view of activities typical in the particular field. Thus, the fact that experimentation may be complex does not necessarily make it undue, if the art typically engages in such experimentation.
Amount of direction or guidance present	The more guidance, the better.
Presence or absence of working examples	Working examples are not required but very helpful. Even prophetic examples can be helpful.
Nature of the invention	As complication increases, more disclosure is needed.
State of the prior art	Applications to inventions in well-developed fields typically require less disclosure.
Relative skill of those in the art	The more the inventor's skill level is above that of others in the art (in terms of education and/or years of experience), the more disclosure that is needed.
Predictability/unpredictability of the art	The chemical and biotech arts are generally considered to be more unpredictable, whereas the mechanical and electrical arts are considered to be more predictable. Fields can become more predictable as they develop.
Breadth of the claims	As claim scope increases, more disclosure is needed.

The concept of undue experimentation with respect to enablement was set forth by the Supreme Court in 1916<sup>15</sup> but it was the Federal Circuit's 1988 *In re Wands* decision that first articulated what is to be considered when evaluating whether experimentation needed to practice the invention was undue and, thus, the disclosure was not enabling.<sup>16</sup>

enablement requirement is distinct from the written description requirement and goes beyond merely explaining how to make and use the invention. For example, an applicant could show possession of a claimed chemical compound by disclosing the chemical structure itself, but the structure may not convey the necessary information to allow a person of ordinary skill in the art to make the chemical compound.

## Best mode

Disclosing what the inventor believes to be the best way to practice the invention at the time the application is filed satisfies the best mode requirement. In general, this requirement is not an issue, but it must be kept in mind if an inventor improves the invention while the patent application is being prepared, after the first application is filed, or when filing subsequent related patent applications. Although your attorney will likely ask you if there have been developments in the technology since you prepared the invention disclosure or the earlier application was filed, it is always best to be aware of this potential problem and keep your attorney apprised of significant developments.

## Your most important asset

Patents protect one of the most important assets a company has—its intellec-

tual property. Regardless of patent type, certain requirements must be met before a patent is granted, or which may be a basis for invalidating a patent in court.

My next article will provide a detailed analysis of the AIA as it applies to the ceramic and glass industry, including best practices for working within it.

## About the author

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## References

- <sup>1</sup>A. Kastalsky, "Nanotube array light-emitting diodes," US Pat. No. 8,610,125, Dec. 17, 2013.
- <sup>2</sup>G.D. Zhang and R.R. Vandamme, "Semiconductor and solar wafers," US Pat. No. 8,310,031, Nov. 13, 2012.
- <sup>3</sup>A. Tanabe, "Semiconductor device and manufacturing method thereof," US Pat. No. 8,598,055, Aug. 13, 2013.
- <sup>4</sup>*Topliff v. Topliff*, 145 US 156 171 (1892).
- <sup>5</sup>35 U.S.C. §101
- <sup>6</sup>*Mayo v. Prometheus*, 132 S.Ct. 1289, 1293 (2012).
- <sup>7</sup>35 U.S.C. §101
- <sup>8</sup>35 U.S.C. §102
- <sup>9</sup>*Titanium Metals Corp. of America v. Banner*, 778 F.2d 775 (Fed. Cir. 1985).
- <sup>10</sup>35 U.S.C. §103
- <sup>11</sup>*KSR Int'l Co. v. Teleflex Inc.*, 550 US 398 (2007).
- <sup>12</sup>*Graham v. John Deere Co.*, 383 US 1 (1966).
- <sup>13</sup>35 U.S.C. §112(a)
- <sup>14</sup>*Enzo Biochem, Inc. v. Gen-Probe Inc.*, 323 F.3d 956, 963 (Fed. Cir. 2002).
- <sup>15</sup>*Mineral Separation v. Hyde*, 242 US 261 (1916).
- <sup>16</sup>*In re Wands*, 858 F.2d 731 (Fed. Cir. 1988). ■