Drawing the Line: Patentable v. Unpatentable Ideas in Water Treatment

CLIFTON E. McCANN, Venable LLP, Washington, D.C.

IWC-05-34

KEYWORDS: Patent, Patentability, Patent Validity, Patent Infringement, Patent Law, Patent Statute, Section 103, Obviousness, Patent Litigation, Ecolochem, Deoxygenation, Activated Carbon, Hydrazine, Ion Exchange, Patent Damages, U.S. Patent and Trademark Office, Invention, Invention Management.

ABSTRACT: U.S. patent law determines patent rights that can profoundly affect companies' bottom lines. This paper outlines the standard for patentability, discusses the types of evidence used to determine whether the standard has been met, and shows how the standard has been applied to water treatment technology. It also describes the rights accorded by patent, presents an analytical framework for assessing patent rights, and summarizes the do's and don'ts of good invention management.

INTRODUCTION

The U.S. patent system has supporters and detractors, with good reason. Some patents are for useful inventions and deserve protection. Others are the subject of jokes, complaints, and demands for reform. Not too long ago patents were half-jokingly called "licenses to sue."

But whatever one might think of particular patents issued by the U.S. Patent Office, the system provides a tried and true inspiration to innovate. It sets the standard for patentability, defines rewards for those who contribute valuable ideas to industry, and prescribes punishments for infringement.

This paper is intended to help readers understand and benefit from the patent system. It describes the patent standard and identifies guideposts for assessing patentability. It explains the nature of patent rights and provides a framework to help evaluate and resolve patent disputes. Finally, it recommends practices for managing inventions and patents.

THE THREE BASIC PATENT REQUIREMENTS

The U.S. Patent Statute includes 376 sections and covers roughly 150 pages of text. The three most fundamental requirements for patent appear in three sections. Section 101 describes the types of ideas that can be considered for patent. Section 102 requires that a patentable invention be "novel" or new. Section 103 requires that the invention be "unobvious."

SECTION 101: IDEA MUST CONSTITUTE ELIGIBLE SUBJECT MATTER. Section 101 defines the kinds of subject matter eligible for patent consideration. It is expansive in scope, allowing patent protection for just about any idea having an industrial application.[*] Examples of the types of ideas that can be patented include new or improved products, chemical compositions, chemical processes, new uses for old compositions or processes, and new methods of doing business. The use of living organisms in industrial processes can be patented. Although things found in nature are unpatentable per se, purified forms having an industrial use may be patentable.

SECTION 102: IDEA MUST BE NOVEL. Section 102 requires that a patentable idea be "novel." The novelty requirement under the patent statute bears little resemblance to a dictionary definition of novelty. Instead, it

[*] Section 101 states: "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." Section 101 and this paper are limited in scope to utility patents, as distinguished from design patents.

defines an invention as being novel if it has not previously been made, known, or used by others in certain specifically prescribed ways.[*] The test of Section 102 is basically satisfied if the invention is not the exact same thing that was invented, commercialized, or made public in the past.

Unusual twists under Section 102 deserve mention. First, 102 prevents an inventor from patenting his or her own invention if, more than one year before filing a patent application, the inventor made the invention public or, in the United States, sold or commercially used the invention, or offered it for sale. Thus, even though the invention was first made by the inventor and was new at the time it was made, Section 102 prevents patenting if the inventor waits too long to file. Second, where two unrelated inventors independently make the same invention, the second inventor can sometimes win the right to patent under Section 102 where the first inventor was not diligent in reducing the invention to practice, or where the first inventor abandoned, suppressed or concealed the invention.[**]

Importantly, novelty under Section 102 is assessed by comparing the invention at issue to a single piece of prior art as opposed to some hypothetical combination of several prior art teachings. For example, novelty is assessed by comparing an inventor's process to a process that was described in an earlier trade journal article. It would be inappropriate to assess novelty by combining the description in the journal article with a description that appeared in a second trade journal article. Thus, if the first article taught three steps of the inventor's four-step process, the novelty test would be satisfied. It would not matter if the second article taught the fourth step, as long as neither article, taken individually, taught all four.

Novelty under Section 102 is relatively easy to show, since it requires only the demonstration of some material difference between the claimed invention and the single piece of prior art at issue. For example, a process is considered novel if it operates at pH 8, where a previously described process operated at pH 7, or if the new process employs two reverse osmosis units where the earlier system employed one. These ideas are "different" and therefore new and novel under Section 102.

SECTION 103: IDEA MUST BE UNOBVIOUS. Section 103 sets forth the "unobviousness" requirement and is more demanding than Section 102. In determining unobviousness under Section 103, teachings from multiple sources of prior art can be combined, and the question becomes whether a person of ordinary skill in the art would have found it obvious to come up with the invention based on all available teachings from all prior art sources.[*]

Section 103 is also more difficult to apply than Section 102. Novelty under Section 102 can usually be assessed by an analytical and largely objective comparison. Obviousness, on the other hand, is more subjective in nature – what's obvious to some is not obvious to others. This in turn permits disagreement as to patentability and sometimes encourages detractors to wrongly use hindsight and Monday-morning quarterbacking to dismiss an invention's significance as a routine solution that "anyone" could have done. Due to the poorly understood nature of the patent law standard for obviousness, companies sometimes forgo valuable patent rights, or conversely, waste money on inventions that are not patentable. In the worst case, competitors dispute patent rights for years because one or

---

[*] Section 102 generally permits a patent unless the invention had previously been patented in the U.S. or abroad, described in a publication in the U.S. or abroad, known or used by others in the U.S., in public use or on sale in the U.S., described in a pending patent application that later issued as a U.S. patent, or made in the U.S. by another who did not "abandon, suppress, or conceal" the invention.

[**] A bill pending in Congress would amend many aspects of U.S. patent law, including a change from a so-called first-to-invent patent standard to a first-to-file standard. It is likely that a first-to-file standard will eventually prevail, but the pending bill is stalled in Congress and further discussion is beyond the scope of this paper.

[*] Section 103 states: "A patent may not be obtained though the invention is not identically disclosed or described as set forth in Section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made."

the other has failed to correctly assess patentability.

The drafters of Section 103 recognized the difficulty of drawing the line between obvious and unobvious inventions, and added several key phrases to Section 103 that are of some help. First, Section 103 states that obviousness should be assessed, hypothetically, as if being considered by "a person having ordinary skill in the art to which said subject matter pertains." These persons are problem solvers who, like the inventor, were faced with the same problem. In a particular field of water treatment, for example, it may be shown that ordinary problem solvers had advanced degrees and ten years of experience in the pertinent field. At any rate, this phrase makes it clear that obviousness is not to be determined from the perspective of an expert in the field, a non-technical corporate executive, a judge, or a juror.

Second, Section 103 provides that obviousness should be assessed "at the time the invention was made," not at the time of an infringement or at the time of a patent dispute. This language serves as a warning to would-be patent detractors not to use hindsight when considering what an inventor has done. The prohibition against hindsight often becomes important in view of the potentially long life of a patent – it is sometimes difficult for an infringer, for example, to cast him or herself back many years in time to when the invention was made. The improper use of hindsight is the most common reason for incorrect obviousness assessments.

Third, the text of Section 103 provides that "[p]atentability shall not be negatived by the manner in which the invention was made." This language helps ensure that the bar for patentability is not set too high. Patents may be awarded for meritorious advancements in industry regardless whether a "flash of genius" inspired the invention. Many great ideas come from routine, mundane experimentation or by simply being observant of chance conditions and results that inspire invention. The emphasis is on industrial advance, not sophistication or complexity.*

Despite the helpful text of Section 103, the Statute standing alone poorly defines the line between obviousness and unobviousness. Section 103 tells us that obviousness should be assessed from the perspective of persons ordinarily skilled at the time the invention was made, and tells us that technological sophistication is not required, but questions remain as to just how "inventive" a patentable idea or improvement must be. For a better understanding as to where to draw the line, help is provided by court decisions that have actually applied Section 103 to particular patent disputes. These decisions illustrate the types of evidence that can be legitimately used to show obviousness or unobviousness, and they suggest the weight various types of evidence should be accorded.

Prior court decisions dearly show that consideration of the nature of the invention's advance over the prior art is important. This requires a comparison of the claimed invention to everything that was taught before. Sometimes this comparison will show that the invention is pioneering in nature or yields surprising and synergistic results. When present, courts find such evidence helpful in showing unobviousness. But beyond these technological differences, court decisions show that consideration of other evidence – evidence of motivation to follow the inventor's path and evidence of conditions in the industry before and after the invention was made – is essential to a proper determination under Section 103. These other types of evidence will now be considered in turn.

Evidence Regarding Motivation. Too often when assessing patentability, the assessor – whether an inventor, a technology manager, an infringing company, or a lower court – will conclude that an invention is unworthy of patent protection because its unconnected parts are described in various sources of prior art. But almost every invention is some combination of elements that were previously present in some uncombined form.

* It is fundamental error to limit patent protection to pioneering or technologically sophisticated inventions. The Patent Statute implements the government's power to grant patents to: "promote the progress of science and useful arts" (U.S. Constitution, Art. 1, Sec. 8, Cl. 8). As such, patents are intended for ideas that advance or "promote" an industry. The U.S. Supreme Court and the U.S. Court of Appeals for the Federal Circuit have repeatedly recognized that some of the most useful ideas are sometimes the simplest.

If an invention could be found obvious simply by showing that all its parts existed in various prior art teachings, few if any patents would ever be granted.

Instead, a detractor must go further and show that a person of ordinary skill, with no advance knowledge of what the inventor had done, would have had some motivation to select and combine the prior art parts to accomplish the invention. For example, where a claimed invention is a structure consisting of three parts – a filter, a mixed ion exchange bed, and two reverse osmosis units – a preexisting motivation to make the invention could be evidenced by a first reference showing a filter, mixed bed and single RO unit, considered in light of a second reference suggesting that two RO units are better than one. Assuming no other prior art teachings would tend to suggest the undesirability of using two RO units in the claimed application, this evidence would tend to show that a hypothetical person of ordinary skill would have been motivated to make the invention, and that the invention therefore would have been obvious.

Conversely and sometimes surprisingly, however, the prior art may include teachings that would have tended to send would-be inventors away from the invention rather than toward it. A good example of such "teaching away" evidence is found in the case of *Ecolochem, Inc. v. Southern California Edison Company*, where Ecolochem inventors William S. Miller and the late Richard C. Dickerson had been awarded a patent for a three-step deoxygenation process and where SCE had challenged the patent for obviousness. The process involved three steps: Adding hydrazine to water containing dissolved oxygen, passing the water through activated carbon, and then purifying the water with ion exchange resin beds. By the time of the invention in 1983 the first two steps were well known, that is, using hydrazine to react with and remove dissolved oxygen was well known, and it was well known that this reaction was catalyzed with activated carbon. Also, ion exchange was by then a very common water purification tool. SCE assumed it could avoid paying royalties to Ecolochem (now GE Mobile Water, Inc.) by arguing that the inventors' combination of well-known elements was obvious.

Edison's argument failed because it overlooked critical evidence of teaching away. In 1983 carbon was known as a dirty material in the nuclear power industry, and more sophisticated alternatives were favored as substitutes. Ecolochem cited three prior art publications that taught away from Ecolochem's invention for these and other reasons, and evidence showed that Ecolochem's competitors and the industry in general had ignored or rejected the Miller/ Dickerson path in favor of vacuum degasification and other alternatives. By bucking the industry trend, Ecolochem's inventors helped solve a very serious corrosion problem that had been plaguing PWR-type nuclear reactors. The U.S. Court of Appeals for the Federal Circuit ("Federal Circuit") heavily weighed this evidence and rejected Edison's argument, saying that the best defense against a hindsight-based obviousness analysis is "the rigorous application of the requirement for a showing of a teaching or motivation to combine the prior art references."[*]

Conditions in Industry Before And After Invention Was Made. Conditions and events in the industry, both before and after the invention was made, can greatly illuminate the inventive or non-inventive nature of the inventor's contribution. The U.S. Supreme Court and the Federal Circuit have warned that such evidence *must* be considered in any obviousness analysis under Section 103. This evidence includes evidence of:

The existence of a long-felt but unsolved need in the industry. The fact that an industry continued to suffer the consequences of a problem, without finding a solution, tends to indicate that the inventor's claimed solution was not obvious. To be effective, however, such evidence must show that the industry tolerated the problem for a sufficiently long period of time. In *Ecolochem v. Edison*, the Federal Circuit found that there had been a serious need for a solution to the PWR corrosion problem, but that the need had existed for less than two years and was therefore not a "long-felt" need indicative of unobviousness.

[*] The U.S. Court of Appeals for the Federal Circuit has exclusive federal appellate jurisdiction over all U.S. patent appeals. The Federal Circuit reversed the U.S. District Court for the Central District of California (Los Angeles) in September 2000 and required the District Court to assess and award damages to Ecolochem based on Edison's willful infringement.

Failures of others to make the invention. Actual evidence that other problem solvers tried but failed to make the invention can be particularly strong evidence of unobviousness.

Simultaneous making of the same invention by others. Evidence of simultaneous invention can be used by an alleged infringer to help show obviousness. Such evidence may indicate that, since other problem solvers independently made the invention at about the same time as the inventor, the invention merely resulted from an obvious and unpatentable progression of thought. The Federal Circuit in *Ecolochem* found there was evidence that one individual had independently made the claimed invention independently of Ecolochem, and the court considered this as evidence tending to show obviousness.

Commercial success of the invention. An invention's commercial success suggests that others would have had a profit incentive to make the invention and would have therefore been likely to make the invention if it had been obvious. This evidence is strongest when coupled with evidence that the profit incentive had been recognized for an extended period of time before the invention was made. The Federal Circuit in *Ecolochem* found that Ecolochem's sales of its patented deoxygenation process to 28 power plants, with $13M in revenue, was evidence of commercial success tending to show unobviousness.

Acclamation for the invention by others. Acclamations can come in many forms and can show that the industry respected the invention and thought it had value. The invention may win industry awards or be lauded in industry publications. Customer letters may express appreciation for the invention and competitors may acquiesce to the patent's validity and seek licenses. This evidence suggests that the invention was not obvious. In *Ecolochem,* evidence showed that customers and others in the industry had acclaimed the invention and that it had been widely used to help solve the PWR corrosion problem. The Federal Circuit found that the invention had been "warmly received."

Copying of the invention by others. Copying is related to acclamation and can likewise suggest unobviousness. If the copyist is successful in selling an infringing product or service, the copyist's sales can be used by the inventor to help show commercial success of the invention. The Federal Circuit in *Ecolochem* noted that at least two competitors had copied Ecolochem's process, but it considered the evidence of copying to be equivocal and not strongly indicative of unobviousness.

Weighing All Evidence. Once all the different kinds of evidence regarding obviousness have been collected, they must be weighed against each other to make a final conclusion on obviousness under Section 103. The weighing process is a difficult task, and prior court decisions provide only limited guidance. But one thing is clear: the assessor should not conclude that a technological difference over the prior art was obvious or unobvious without first considering the other kinds of evidence described above. Prior court decisions also show that the kinds of evidence that hold most sway are evidence of a long-felt but unsolved need for the invention, a motivation to combine prior art teachings to make the invention or a teaching away from the invention, failures of other problem solvers to make the invention, the nature of the technological advance of the invention over the prior art, and commercial success of the invention in the marketplace. The Federal Circuit found both evidence tending to show obviousness and evidence tending to show unobviousness in *Ecolochem v. Edison*, but in the final analysis, held that evidence of teaching away was pivotal evidence warranting a reversal of the district court and a holding that Ecolochem's invention was unobvious.

WHAT RIGHTS DOES A PATENT PROVIDE?

Once issued, a U.S. patent enables its owner to exclude others from practicing the invention as recited in the patent claims. The right to exclude generally begins on the day the patent issues and ends 20 years from the date the application for patent was filed. As part of the right to exclude, a patent owner may at its option license or assign rights in the invention, or bring litigation to enjoin future infringement and seek damages for past infringement. In exceptional cases, the patent owner may also be entitled to punitive damages and attorneys' fees. In addition, the patent owner has a right to stop importation of infringing articles and to stop importation of materials that have been manufactured by employing an infringing process in a foreign country.

Once confronted with a charge of patent infringement, an alleged infringer has several options. It can refuse to accede to the infringement charge, leaving the patent owner with the option of pursuing an infringement action in federal court. When the patent owner's charge is sufficiently threatening, the alleged infringer can also initiate litigation on its own, requesting a court to invalidate the patent. Second, the accused infringer can stop the complained-of activity (possibly by designing around the patent claims) and attempt to settle with the patent owner with respect to any past infringement. Third, it can seek to negotiate an agreement that includes a license of patent rights or an outright purchase of the patent. Occasionally patent owners and alleged infringers are able to negotiate settlements based upon an exchange of patent rights. Unfortunately disagreements sometimes persist and result in infringement litigation.

A patent owner faces numerous obstacles when pursuing patent infringement in the federal courts. A diligent opponent will search far and wide for additional prior art that may place the patent's validity in doubt. The alleged infringer may develop plausible arguments that it did not infringe or that, because of alleged omissions or misrepresentations by the patent owner to the patent examiner, the patent was gained through "inequitable conduct" and is therefore unenforceable. The costs and risks of infringement litigation may nevertheless be worthwhile, since the award of an injunction preventing the complained-of activity can be of great competitive advantage to the patent owner, and the patent owner may be entitled to substantial monetary awards and a recoupment of attorneys' fees.

Section 284 of the Patent Statute guides the way that courts determine the dollar amount of the actual damages award payable by the infringer to the patentee. It entitles the patentee to recoup the profits it lost as a result of the infringement, provided there is a direct causal relationship between the infringement and the profits lost. In assessing the amount of profits lost, patent owners often benefit by being able to exclude most administrative and overhead expense, and by legal precedent that requires a court to resolve doubts as to the amount of profit lost against the infringer. On the other hand, it is often difficult for a patent owner to prove that the infringement was the cause of lost profits. For example, an infringer sometimes avoids having to pay the patentee's lost profits by demonstrating that there were acceptable alternatives to the claimed invention, such that customers of the infringer would have purchased non-infringing alternatives rather than purchase the invention from the patent owner. Sometimes an infringer is able to show that a patent owner would not have made the infringer's sales, regardless of the infringement, because the patent owner would not have had the capacity to fulfill sales orders from the infringer's customers.

Where a causal relationship between the infringement and the patent owner's lost profits cannot be shown, Section 284 entitles the patent owner to no less than a reasonable royalty.* Courts determine reasonable royalties much the same way reasonable negotiators would arrive at a royalty in actual practice. Thus, many royalties are calculated as a percentage, often in the 25 to 33 percent range, of the dollar amount of profits or cost savings the infringer could have expected to enjoy by using the invention. Evidence that is most likely to affect the amount of a reasonable royalty includes evidence of the existence of an established royalty that other companies have already agreed to, evidence of the existence of acceptable alternatives to the invention, and evidence that sales of the patented invention will generate sales of other products or services. Regardless whether damages are assessed as lost profits or a reasonable royalty, interest on actual damages is almost always awarded a successful patentee.

The stakes are raised when an infringer's conduct is found to be especially egregious. In such cases courts usually add awards of punitive damages (up to a trebling of actual damages), attorneys' fees, and sometimes interest on attorneys' fees. To avoid paying these additional awards, would-be infringers are well advised to assess patent infringement charges carefully, backed up with an opinion of patent counsel, and to investigate the risk of liability before infringing. Infringing without a

* The U.S. Patent Statute also enables a patentee under certain circumstances to retroactively claim reasonable royalties for a period of time *before* its patent was issued, namely, the period between the date the respective patent application was published and the date the application issued as a patent.

good-faith belief that a patent was invalid or not infringed is the biggest factor used to justify the grant of punitive and attorney fee awards. Attempts to conceal an infringement and unfair litigation tactics are other factors.

SETTLEMENT OF PATENT DISPUTES

Patent litigation is expensive and should be considered an option of last resort. According to a recent survey by the American Intellectual Property Law Association, the average patent infringement case, if pursued through to trial and appeal, costs from $.5M to $4M, depending on the amount at stake.* Smart managers will work to find creative incentives for settlement, such as mutually beneficial licensing terms, flexible payment options, and agreements involving business relationships aside from the subject matter of the patent in dispute. Smart managers will also work to open and maintain a constructive dialog, whether through attorneys or principals, to help ensure that neither side has overlooked pertinent evidence or otherwise suffers from false expectations based on unfounded gut feelings as to the amount of damages for past infringement.

One effective way in which unreasonable damages expectations can be avoided is to rely upon an analytical framework that realistically accounts for all the potential awards to the patentee as well as all the obstacles that may prevent the patentee from receiving those awards. A particularly effective analytical approach involves the following basic steps. First, a list is made of each of the possible award components – actual damages, punitive damages, etc. Second, the most likely variations on those components are added to the list. Third, the most likely dollar amount for each component is estimated, as well as the percentage chance that each component will be awarded. Fourth, the dollar amounts are multiplied by the percentages and the resulting products are totaled to arrive at an adjusted total award. Finally, and importantly, the adjusted total award is multiplied by the various risk factors relating to the patent owner's ability to prove infringement and to defend against charges of invalidity and unenforceability. Each of these steps is illustrated below.

In step one, the various remedies sought by the patent owner are listed. These will typically include claims for the following:

- actual damages
- punitive damages
- interest on actual damages
- attorneys' fees/expenses
- interest on attorneys' fees
- costs and post-judgment interest

In step two, the most likely variations on the above components are identified. For purposes of this illustration, it will be assumed that the facts point in different directions as to what kind and amount of actual damages the patentee will be entitled to receive. As a result, the patentee could end up with actual damages based on (a) a reasonable royalty, (b) lost profits on its lost sales of patented equipment, or (c) lost profits on lost sales of the patented equipment as well as unpatented equipment that is related to and sold in conjunction with the patented equipment. Regarding punitive damages, the facts show that the infringer may have carelessly ignored the patentee's rights, and it is possible the patentee would end up with (a) no punitive damages, (b) doubled actual damages, or (c) trebled actual damages.

In step three, the dollar amount of each possible award is estimated, as well as the percentage chance that each will be awarded. For example, based upon the facts in this hypothetical illustration, there is a 50% chance that the actual damages will be in the nature of a reasonable royalty calculated at $10M. There is a 30% chance that the patent owner will prove entitlement to lost profits of $20M on patented equipment. Finally, there is a 20% chance that the patent owner will also prove that it would have made $10M in profit on additional unpatented equipment, for a total of $30M in lost profits.

In step four, the dollar amount of each award component is multiplied by the percentage chance that the component will be awarded, and the resulting products are totaled to arrive at an adjusted award value. For exam-

* The survey of more than 1,600 AIPLA members in March 2003 showed that the median cost of patent litigation, through trial and appeal, was $.5M where less than $1M was at risk, $2M where $1M to $25M was at risk, and $4M where $25M or more was at risk. AIPLA Report of the Economic Survey 2003, American Intellectual Property Law Association, Arlington, Virginia.

ple, in the case of actual damages, there is a 50% chance of receiving $10M as a royalty, so $10M is multiplied by .5 to arrive at $5M. The two lost profit scenarios, by similar computation, result in amounts of $6M (.3 times $20M) and $6M (.2 times $30M). These amounts are totaled to arrive at an adjusted award for the actual damages component of $17M. Table 1 shows a similar assessment of each of the possible award components to arrive at a total adjusted award of $45.4M.

Step five is important and the step most frequently unaccounted for in patent owners' expectations. Although patents provide valuable rights and are presumed valid, numerous obstacles stand in the way of proving an alleged infringer is actually liable. In this illustration, it is assumed the infringer has located prior art that had not been considered by the patent examiner when he issued the patent. The new art has thrown considerable doubt on the possibility that validity can be sustained, resulting in a 50% risk factor for the patentee. The infringer has also made relatively weak arguments for non-infringement and inequitable conduct, but because of the uncertainties of judge and jury decisions, there remains some small but material risk that the infringer's challenges will be sustained. In this illustration, the alleged infringer is given a 20% chance of demonstrating non-infringement and

TABLE 1: CALCULATION OF TOTAL ADJUSTED AWARD

COMPONENT CLAIMED BY PATENT OWNER	AMOUNT OF COMPONENT IF AWARDED	CHANCE COMPONENT WILL BE AWARDED	PRODUCT OF AMOUNT TIMES CHANCE	SUBTOTALS
ACTUAL DAMAGES				
Reasonable Royalty	$10M	50%	$5M	
Lost Profits (based on patented equipment only)	$20M	30%	$6M	$17M
Lost Profits (based on patented and unpatented equipment)	$30M	20%	$6M	
PUNITIVE DAMAGES				
None	0	20%	$0M	$20.4M
Doubled Actual Damages	$17M	40%	$6.8M	
Trebled Actual Damages	$34M	40%	$13.6M	
INTEREST ON ACTUAL DAMAGES	$6M	95%	$5.7M	$5.7M
ATTORNEYS' FEES	$3M	60%	$1.8M	$1.8M
INTEREST ON ATTORNEYS' FEES	$1M	30%	$.3M	$.3M
COSTS	$.2M	95%	$.19M	$.19M
			TOTAL ADJUSTED AWARD:	$45.4M

a 5% chance of demonstrating inequitable conduct. All these risks to the patent owner are compounded. When multiplied against the total adjusted award of $45.4M, the result is a settlement value of $17.2M. This calculation is shown in Table 2.

The foregoing analytical analysis is useful in establishing settlement value for an alleged infringer's past activities, and should be used as a reality check against any gut feeling as to how much the settlement of a patent dispute is worth. The calculation shown in Table 2 is also helpful as a reality check in computing a reasonable royalty for future use of an invention, whether or not a lawsuit has been filed. The calculation of Table 2 serves as a reminder to the patent owner that, for a royalty to be reasonable, it must take risks into account, such as the patentee's risk that the patent would be found invalid, unenforceable, or not infringed.

The foregoing analysis does not account for other factors that may impact settlement value, some of which may be incorporated into a similar albeit more complicated analytical framework. An alleged infringer may have counterclaims alleging anticompetitive behavior or other violations of the patentee, and if so, the potential awards and risks for the infringer would need to be taken into account. The parties must consider the risk to the patentee that, if its patent is found invalid as a result of litigation against the alleged infringer, it will be unable to later resurrect the patent, and it will accordingly lose future market advantage and potential licensing revenue. The parties may also need to factor in the risks and rewards of injunctive relief. Once a court finds an infringer liable for infringement, an injunction against further infringement is imposed. If the patentee is unwilling to offer a license at that point, the injunction could cost the infringer design-around expense, a loss of sales and profits, and loss of market share.

Other less tangible components may also come into play. Patent litigation involves disruption to a party's regular business operations – time is required to develop facts, to provide answers to information and document requests from the other side, and to participate at trial. The litigation process can present risks to the integrity of trade secrets and other business information, and litigation can sometimes result in unwanted attention in the press. These less tangible concerns are often but not always equally pertinent to both sides.

GOOD INVENTION MANAGEMENT

The patent system is here to stay. The number of patents granted and the number of patent lawsuits filed have greatly increased over the last ten years, and infringement liability has resulted in awards of up to tens and hundreds of millions of dollars. For both offensive and defensive reasons, good invention management is important. The following is a summary list of do's and don't's:

MARSHALL NEW IDEAS. In many companies employees routinely face and solve problems. Some solutions are of minimal value or are known to be copied from what has been done by someone else before. But where commercially valuable and potentially unobvious solutions arise, routine procedures should be in place for assuring the ideas will be properly evaluated, including periodic reminders

TABLE 2: CALCULATION OF SETTLEMENT VALUE

TOTAL ADJUSTED AWARD	X	CHANCE VALIDITY CHALLENGE WILL FAIL	X	CHANCE INFRINGEMENT WILL BE ESTABLISHED	X	CHANCE INEQUITABLE CONDUCT CHALLENGE WILL FAIL	=	SETTLEMENT VALUE
$45.4M	X	.50	X	.80	X	.95	=	$17.2M

to company personnel as to the need to alert management to potentially important ideas, and periodic meetings of an appropriate evaluation team of technical, business, and legal personnel.

DILIGENTLY CONSIDER PATENTING. If more than one inventor independently make a patentable invention, the patent can go to the more diligent of the two even if that inventor was not the first to conceive the invention. Patent rights in the United States are also lost when an inventor sells, offers for sale, or commercially uses his or her invention in the United States or makes the invention public, and then waits more than one year to file a patent application. The laws of most foreign countries are even more restrictive, generally denying inventors the right to file patent applications for inventions that have been publicly disclosed.

KEEP RECORDS OF INVENTION. Because inventorship contests are still possible under U.S. law, and since it may be important to establish that an invention was made prior to the issuance of potentially conflicting prior art, documentation of conception and development should be carefully maintained. Documentation may be by way of computer files as long as those files are kept safe from destruction or alteration. Finally, all evidence of unobviousness – teaching away, awards and accolades, etc. – should be collected and maintained in case the validity of an important patent is challenged.

KEEP TABS ON COMPETITORS. It is impossible to know all about the new products and processes a competitor may be developing, but it is nevertheless important to be mindful of competitors' possible patent rights when considering the development and introduction of new ideas. Before embarking on new ventures, a state-of-the-art or infringement search of relevant patents may be warranted. Such a search may also be helpful in identifying already issued patents of interest that may be available for licensing.

OBTAIN INVENTION AGREEMENTS. Many states provide shop rights to an employer when an inventor makes an invention on company time or with company resources. However, good invention management will include procedures for having new employees agree to assign all invention rights, not just shop rights, to the company. Procedures should also be in place to help ensure that employees, suppliers, customers, and others sign confidentiality agreements to ensure that patentable ideas and trade secrets are not released to the public.

MAINTAIN PATENT RIGHTS. The U.S. Patent and Trademark Office and foreign patent offices require maintenance fees to keep patents in force. A good docketing system, typically maintained by patent counsel or an annuity payment service, is important to ensure rights are not abandoned. If a patent is not being used, consideration can be given to selling or licensing rights in the invention to others. Finally, the Patent Statute provides that patented products, materials, and equipment should be marked with the number of the corresponding patent. Patent owners should establish procedures to ensure that such marking takes place, since a failure to mark can result in a loss of damages for infringement.

MANAGE PATENT COSTS. Patenting is expensive. It can cost from $10,000 to $20,000 to file a U.S. patent application, and there can be equal costs to prosecute a patent to issuance. Foreign patenting is additional and varies considerably from country to country. It is important to have complete and reliable estimates from counsel before undertaking patent efforts, and before embarking on a new patent effort, realistic business criteria should be applied to help ensure that the costs of patenting are commercially warranted. Finally, consider creative fee arrangements with patent counsel, such as an agreement that counsel will discount charges that exceed estimates.

CONCLUSION

The U.S. patent system is complex and sometimes confusing, but it serves a useful function and must be reckoned with. By understanding the basic requirements for patent and the rewards made available through patent protection, companies can employ the system to maximize the benefit of research and development in new ideas. When patent disputes arise, the assessment tool provided above can help avoid unreasonable expectations and foster settlements in line with actual value.