

WRITING CHEMISTRY PATENTS AND INTELLECTUAL PROPERTY

A PRACTICAL GUIDE



FRANCIS J. WALLER

 WILEY

Table of Contents

Cover

Title page

Copyright page

DEDICATION

PREFACE

ACKNOWLEDGMENTS

*CHAPTER 1 BACKGROUND AND
HISTORICAL PERSPECTIVE ABOUT
INTELLECTUAL PROPERTY*

INTRODUCTION

BOOK STRATEGY FOR PATENTS

A BRIEF HISTORY OF PATENTING

*INTELLECTUAL PROPERTY: IS IT IMPORTANT
OR NOT?*

THE U.S. PATENT AND TRADEMARK OFFICE

*WHY INTELLECTUAL PROPERTY PROTECTION
IS CURRENTLY IMPORTANT*

INFORMATION OVERLOAD AND PRIOR ART

*CHINA AS AN EMERGING INTELLECTUAL
POWERHOUSE*

PATENTS AS SOURCES OF TECHNOLOGY

PATENTS IN FORCE WORLDWIDE
CHAPTER SUMMARY
QUESTION

CHAPTER 2 BRIEF INTRODUCTION TO VOCABULARY AND DEFINITIONS

INTRODUCTION
SHORT STORY FROM PANAMA
PATENT TERMINOLOGY
TRADE SECRET DEFINITION
COPYRIGHT
TRADEMARK DEFINITION
CHAPTER SUMMARY
QUESTIONS

CHAPTER 3 YOUR FIRST DECISION: TRADE SECRET OR PATENT?

INTRODUCTION
TRADE SECRET
PATENT
COMPARISON BETWEEN A TRADE SECRET AND A PATENT
CHAPTER SUMMARY
QUESTION

CHAPTER 4 WHAT COMES FIRST: A PROVISIONAL OR NONPROVISIONAL PATENT APPLICATION?

INTRODUCTION

PROVISIONAL PATENT APPLICATION
NONPROVISIONAL PATENT APPLICATION
PATENT APPLICATION COMPARISON
CHAPTER SUMMARY
QUESTION

CHAPTER 5 REASONS FOR PATENT OFFICE REJECTIONS

INTRODUCTION
PATENTABLE INVENTION AND ITS USEFULNESS
NOVELTY
NONOBVIOUSNESS
OTHER REASONS FOR A REJECTION
CHAPTER SUMMARY
QUESTION

CHAPTER 6 REASONS FOR INVALID PATENTS

INTRODUCTION
EXPERIMENTS: ACTUAL OR BY INSIGHT
PRIOR ART DISCLOSURE
ISSUED PATENT IS INVALID
INEQUITABLE CONDUCT
OTHER CONSIDERATIONS WHEN WRITING YOUR FIRST PATENT APPLICATION
ANOTHER POINT OF VIEW
CHAPTER SUMMARY
QUESTION

CHAPTER 7 EXAMPLES OF PATENT SPECIFICATIONS

INTRODUCTION

KEY TO PATENTING SUCCESS

WHY UNDERSTANDING PATENTS IS IMPORTANT

TYPICAL PATHWAY FOR PATENT APPLICATION WITHIN A COMPANY

CLAIM 1 AND 2 OF U.S. PATENT 5,247,190

EXAMINATION OF U.S. PATENT 5,872,289

FORMAT FOR PATENT WITH FEDERAL SUPPORT

EXAMINATION OF U.S. PATENT 6,369,239

EXAMINATION OF U.S. 2004/0010115A1

EXAMINATION OF U.S. PATENT 7,071,289

EXAMINATION OF U.S. PATENT 5,273,995

EXAMINATION OF U.S. PATENT 7,253,209

COMPARING CLAIM LANGUAGE WITH WRITTEN DESCRIPTION OF INVENTION

CHAPTER SUMMARY

QUESTIONS

CHAPTER 8 WRITING THE PATENT APPLICATION

INTRODUCTION

THE INVENTIVE PROCESS

SUMMARY OF OUR UNDERSTANDING FOR PATENTS AND TRADE SECRETS

IDENTIFYING A PROBLEM TO BE SOLVED

METHODOLOGY TO SOLVE A COMPLEX PROBLEM

POSSIBLE INVENTIONS FROM OUR EVERYDAY READING

PATENTABILITY REQUIREMENTS

CIRCUMVENTING THE RULES OF ELECTROPHILIC AROMATIC SUBSTITUTION

WATER SPLITTING VIA RUTHENIUM COMPLEX

DETECTING MECHANICAL STRESS WITHIN A POLYMER

PLACES TO FIND FUTURE PROBLEMS

CONTROLLING MOLECULAR SIZE OF SEMICONDUCTOR QUANTUM DOTS

CHAPTER SUMMARY

QUESTION

CHAPTER 9 AN EXAMINATION OF CLAIM FORMAT

INTRODUCTION

INTERPRETATION OF CLAIMS

GENERAL BACKGROUND ABOUT CLAIM LANGUAGE

MORE DEFINITION ABOUT CLAIMS

SPECIFIC CLAIM LANGUAGE

CHAPTER SUMMARY

CHAPTER 10 WHY YOU NEED CONFIDENTIALITY AGREEMENTS

INTRODUCTION
CONFIDENTIALITY AGREEMENTS IN
GENERAL
IMPORTANT ELEMENTS WITHIN A
CONFIDENTIALITY AGREEMENT
CHAPTER SUMMARY
QUESTION

CHAPTER 11 PRACTICAL
INFORMATION ABOUT COPYRIGHTS
AND TRADEMARKS

INTRODUCTION
COPYRIGHT
COPYRIGHT INTERPRETATION
ADJUNCT PROFESSOR APPOINTMENTS AND
THE COPYRIGHT
FILING FOR A COPYRIGHT
TRADEMARKS
CHAPTER SUMMARY
QUESTION

CHAPTER 12 GLOBAL PATENT FILING
AND PATENTING STRATEGY

INTRODUCTION
DEVELOPING A PATENT STRATEGY
INTERNATIONAL PATENT FILING
FILING OPTIONS
CHAPTER SUMMARY
QUESTIONS

CHAPTER 13 WHAT ACADEMIC SCIENCE FACULTY SHOULD KNOW ABOUT PATENTS AND COPYRIGHTS

INTRODUCTION

RECENT BACKGROUND

**WHAT SHOULD YOU DO AFTER HAVING A
NOVEL CONCEPT?**

NOTEBOOKS

INVENTION DISCLOSURE

CONFIDENTIALITY AGREEMENTS

COPYRIGHTS

CHAPTER SUMMARY

QUESTIONS

CHAPTER 14 INTELLECTUAL PROPERTY RESOURCES

INTRODUCTION

BRIEF SUMMARY OF SELECTED

INTELLECTUAL PROPERTY BOOKS

INTELLECTUAL PROPERTY COURSES

WORLDWIDE PATENT OFFICES

EMERGING TECHNOLOGY FIELDS

USEFUL ORGANIZATION

CHAPTER SUMMARY

CHAPTER 15 BOOK SUMMARY AND ON YOUR OWN

INTRODUCTION

**PENDING INTELLECTUAL PROPERTY
DEVELOPMENTS**
SUMMARY OF PREVIOUS CHAPTERS
RESPONSIBILITIES OF THE INVENTOR
CONCLUSIONS
CHAPTER SUMMARY

**CHAPTER 16 RESPONSES TO
QUESTIONS AT END OF CHAPTERS**

CHAPTER 1
CHAPTER 2
CHAPTER 3
CHAPTER 4
CHAPTER 5
CHAPTER 6
CHAPTER 7
CHAPTER 8
CHAPTER 10
CHAPTER 11
CHAPTER 12
CHAPTER 13

CHAPTER 17 PATENT APPENDIX

**USEFUL INFORMATION BESIDES THE
INVENTION**
CHAPTER SUMMARY
U.S. PATENT 5,872,289
U.S. PATENT 6,369,239

U.S. PUBLISHED PATENT APPLICATION
2004/0010115A1

U.S. 7,071,289 WITH CERTIFICATE OF
CORRECTION

U.S. PATENT 5,273,995

U.S. PATENT 7,253,209

Index

**WRITING CHEMISTRY
PATENTS AND
INTELLECTUAL
PROPERTY**
A Practical Guide

FRANCIS J. WALLER

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This book is dedicated to my wife, Patricia L. Waller, Ed.D., who has encouraged me with my professional ambition of conveying practical information to my peer group, undergraduates and graduate students, and younger students from grades 1 to 12.

PREFACE

There will probably be several different audiences that will read this book. The first is the intellectual property novice who, like me 40 years ago, did not know what *intellectual property* actually meant. It is this audience that I hope to reach. Then the second group of people are the new employees entering the chemical technology workforce, either in academia or in industry, where protecting intellectual property will be relevant to their jobs. This book, I hope, will be helpful in discussing intellectual property—including patents, copyrights, trademarks, and trade secrets—with the appropriate attorney who will assist you in your endeavors. The next-to-last group of readers will be members of the general public who would like to better understand some of the intellectual property cornerstones that drive innovation and are available to protect individuals and corporations from worldwide competition. The last group of readers are the individuals who will be taking the initiative to write their own chemical patent applications, obtain advice from a patent attorney, and together file that patent application. To all these readers this book is to be viewed as a practical guide. Many of the chapters are short and to the point.

Intellectual property comes in many forms. It can be a patent, copyright, trade secret, or trademark. The protection of chemical science and technology through intellectual property allows individuals, companies, and countries to develop the results of chemical science and technology into marketable products in an orderly fashion. The development of these results is part of the innovation process. If the chemical science and technology represent a paradigm shift or a product worth billions of dollars in the marketplace, your intellectual property may be challenged through litigation. Therefore, it is imperative that the owners of the intellectual property understand the basics of each form and

how each form will protect their ideas. My intent in writing this book is to cover these centerpieces of intellectual property in a depth that is useful and practical to the general reader and chemical practitioner. It is also hoped that this book can be a supplemental textbook for an academic semester course on intellectual property.

When I started my industrial career at E. I. duPont deNemours and Company, Inc., my formal education did not include a knowledge of intellectual property. Now after 30 years of an industrial career, I still find newly trained scientists, engineers, entrepreneurs, and individual inventors to be uninformed about intellectual property. It is hoped that this book will give interested individuals the basic understanding behind patents, copyrights, trade secrets, and trademarks and allow them to approach each with some working knowledge. With additional textbook references noted in Chapter 14, intellectual property owners can enhance their knowledge of intellectual property and become more educated individuals.

In addition, at the end of most chapters, I have added a section called "Additional Reading." The resources listed there are examples of the many articles about similar facts. I have used such data to help readers understand my narrative. These added resources present additional points of view about some of the information I present.

My formal graduate education is within the discipline of organic chemistry. Teaching a new discipline forces you to learn the science or subject matter well—at least well enough to be able to convey the learned subject matter to someone else. I have done this with graduate courses in the disciplines of polymer science and material science. It is hoped that what you learn between the first and last pages of this book gives you the basic skills to understand and practice intellectual property in conjunction with an intellectual property attorney.

The majority of this book is taken from a one-day short course titled “Practical Approaches to Patents and Other Forms of Intellectual Property” developed by me for the American Chemical Society® in early 2006. Since that time, the notes for the short course are in version five, thanks to the feedback from the course participants. The American Chemical Society® offers the short course at National American Chemical Society meetings and at on-site company locations. My overall approach in teaching the short course and in this book is to explore how history has affect intellectual property, to understand the basics of each form of intellectual property, and (since the book focuses primarily on writing patents) to discuss reasons for patent rejections and invalid claims. During the development of this strategy, we will look at specific selected patents to illustrate patent-writing methology. In addition, comparisons will be made between patents and trade secrets and provisional versus nonprovisional patent applications. Copyrights and trademarks will briefly be discussed as another means to protect intellectual property. Then, a brief discussion will cover confidentiality agreements and the foreign filing of patent applications. Last, useful information will be covered for academic chemical science faculty.

I am not a patent attorney or a patent agent and consider myself one who uses intellectual property. While employed as a senior research associate at Air Products and Chemicals, Inc., and as a project leader at DuPont®, I have been fortunate to work closely with many different intellectual property attorneys and patent liaison personnel who were willing to share their expertise with me. So it is hoped that the information summarized in this book enables you to become a better intellectual property user.

FRANCIS J. WALLER

ACKNOWLEDGMENTS

I wish to thank all the patent and legal attorneys whom I have met in my 30-year industrial career. Many of these attorneys were willing to share with me their individual passion for intellectual property. An equal amount of thanks goes to all the participants in my short course, “Practical Approaches to Patents and Other Forms of Intellectual Property,” offered through the American Chemical Society®. These students have challenged me in meeting their expectations for taking the short course.

People who have helped make this book possible are

- 1.** Mrs. Teri Hoppe, who diligently has taken my written and spoken words and transformed them into the manuscript that you see here.
- 2.** Mrs. Amy Kovalski, who edited the manuscript for grammar and consistency of the chapters.
- 3.** The reviewers, who offered feedback to make this book more worthwhile.

The ideas in this book are the author’s and not those of E. I. DuPont deNemours and Company, Inc., or Air Products and Chemicals, Inc. In addition, the content of this book should not be a substitute for professional intellectual property counsel. The author has tried to ensure that the information in this book is correct at the time of the galley proofs. The author’s ideas expressed in this book are based on firsthand experience working with attorneys, teaching a short course for the American Chemical Society® titled “Practical Approaches to Patents and Other Forms of Intellectual Property,” and extensive reading about intellectual property. The information in this book is not legal advice but is meant to acquaint the reader with facts about intellectual property. The facts gathered from other cited references are added or

interpreted by the author to make this book useful for the general public.

CHAPTER 1

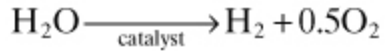
BACKGROUND AND HISTORICAL PERSPECTIVE ABOUT INTELLECTUAL PROPERTY

CHAPTER OBJECTIVE

The objective of this chapter is to provide the reader with an overview of the concept of intellectual property. Many new terms will be introduced here and discussed in detail later throughout the remaining chapters. In a similar manner, the examples introduced here will be used and expanded in later chapters. With this introduction, you will begin to understand that inventing or expressing in words something believed to be technically novel is only the beginning; you must determine within the world information domain if it really is novel as a matter of law and then pursue the necessary steps to obtain a patent, copyright, trademark, or just keep it as a trade secret.

INTRODUCTION

The human intellect can create a novel, new, or not currently known concept, idea, or thought in the mind. Therefore, intellectual property is an intangible creation of the intellect. When a novel concept or idea is reduced to practice by someone, the inventor, it now becomes a tangible creation that can be protected by a patent. For example, say your novel concept is to capture sunlight to convert water to hydrogen and oxygen.



The *reduction to practice* or how your invention would work has three key components. First, you need a bimetallic nanoparticle. Second, the nanoparticle activates water to generate hydrogen atoms and an epoxide connected to the surface of the nanoparticle. Third, hydrogen and oxygen are released from the surface of the nanoparticle. You must further define the nature of the bimetallic character of the nanoparticle and describe the nanoparticle: particle size, particle composition, and bimetallic loading. Remember, not all metals in combination would function as a bimetallic catalyst for this reaction. In addition, the particular particle composition must be able to form an epoxide and connect to hydrogen atoms. Also the release of hydrogen and oxygen from the surface of the nanoparticle may require a desorption process, which may be heat activated. Therefore, you can readily see, to come up with a novel concept and then to determine how it would work are not easy operations. But eventually, when the specifics of the reduction to practice are worked out and a model is demonstrated, you have an invention. Similarly, when you commit your thoughts to paper or screen, the tangible expression can be protected by a copyright. Therefore, legal protections of tangible creations include patents and copyrights. Other legal protections include trademarks and trade secrets.

If you visit a Java City coffee shop and purchase coffee in their container, you will quickly note that the words *Java City* on the cup are followed by a ™ symbol. The ™ symbol means “trademark.” Also, on the side of the container, there appears © 2007 Java City, Inc. All Rights Reserved. This phrase means that the text on the back of the coffee container is protected by a copyright. The © symbol means “copyright”. Now if you read the text, part of a sentence reads “using a unique time-signature process.” This could

mean that Java City, Inc. may have a patent on some unique process to roast the coffee beans or the referenced unique process could be protected by a trade secret. So the use of the different forms of intellectual property could give Java City, Inc. a competitive edge in the marketplace. The symbols ™ and © will be discussed further in another chapter.

Before I began to pull intellectual property examples together to illustrate various points in this book, I noticed that I had several pencils on my desk. One has the Penn State® logo and eleven paw prints. Next to each paw is the notation ™. Both of these symbols, ® and ™, refer to trademarks. The ® is used to indicate that the trademark is federally registered. The ™ symbol usually, but not always, means the potential owner of the trademark has filed for federal registration for a class of goods but not yet received it.

Recently, I was reading the *Smart Money*® magazine¹ and noticed an advertisement for AT&T®. Toward the bottom of the page were the words “© 2009 AT&T Intellectual Property and AT&T, the AT&T logo, all other marks contained herein are trademarks of AT&T Intellectual Property and/or AT&T affiliated companies.” I think from this and the earlier examples you can see that companies take the use of their trademarks and copyrights very seriously. So as you read other advertisements, look for the ©, ®, and ™ symbols, and you may be surprised at how many logos and unique sets of words or phrases are actually protected by trademarks while the written expression is protected by a copyright. Even this book is copyright protected.

Intellectual property is all around us. In 2008, J. K. Rowling, the author of the best-selling Harry Potter book series, and Time Warner, Inc., were engaged in a copyright trial in federal court against RDR Books.² In this example, RDR Books was planning publication of a Harry Potter reference

guide. At issue in this trial was the question of whether RDR Books took too many quotations and plot summaries from Rowling's work. Here the copyright doctrine of *fair use* was being challenged. Fair use allows a limited amount of copyrighted material to be incorporated into another author's work without requiring permission from the copyright owner under certain situations. These situations include scholarly work and critiques for noncommercial purposes. However, I believe, the reported reference guide here was for commercial purposes. In the trial, the judge halted publication of the Harry Potter reference guide. He ruled that the reference guide would violate the copyright owned by Rowling because fair use was not being followed. One must remember that using an unnecessary amount of verbatim material from another work that is protected by a copyright can lead to litigation. Apparently, RDR Books did not change the original work with any new meaning or commentary. In the Preface, I noted that if your product is worth a very large amount of money in the marketplace, your intellectual property may be challenged through litigation. The Harry Potter series is very popular and successful in the marketplace. Further discussion about copyrights will be presented in Chapter 11.

Another example of intellectual property in the news occurred in 2006 with the Coca-Cola Co. when they alleged the stealing of confidential documents and a sample of a new coke product.³ Three employees of Coca-Cola Co. were alleged to have tried to sell the items to Pepsi Co., Inc. The confidential documents were deemed trade secrets. Trade secrets, if protected adequately, will give the holder of the trade secrets certain rights if the trade secrets end up in a competitor's hands. Remember, the long-used syrup formula that gives Coca-Cola® its unique flavor is still a trade secret. Further discussion about trade secrets will be deferred until Chapter 3.

The last example of intellectual property from the press is Medtronic® suing Boston Scientific® in 2006 for patent infringement.⁴ This case involved stents to prevent blockages in coronary arteries. The stent market was about \$4 billion in 2008. A U.S. District Court in Texas found Boston Scientific® had infringed three patents used by Medtronic®. The judge ruled that Boston Scientific® must pay Medtronic® \$250 million. However, in 2008 a federal judge found two of the Medtronic® patents unenforceable. The judge reduced the \$250 million damages to \$19 million. In more recent court decisions, Boston Scientific® may also have infringed patents held by Johnson & Johnson® involving heart stents. It can readily be seen that the major manufacturers of heart stents are involved in patent infringement litigation. In fact, some of the litigation goes back a decade! Again, this points out that if you've developed an innovative product that's worth very large amounts of money in the marketplace, your intellectual property may be challenged through litigation.

A more detailed discussion about patents, valid claims, infringement, and enforceability will be discussed in later chapters, but this brings up an important point regarding patents. For a patentee, the owner of a patent, to succeed in litigation, getting the patent application nearly correct the first time is very important. As an inventor, you do not want your patent application finally rejected by any patent office, nor do you want to have invalid claims. Patent claims do not, by law, infringe other patent claims. Making, using, offering to sell, selling, or importing into the United States a patented invention is what infringes patent claims. If the claims of one patent were identical to the claims of an earlier patent, those claims might be invalid as anticipated. Those claims, however, would not infringe the claims of the earlier patent. The manufacture, use, offer for sale, sale, or importation of a product falling within the scope of those

claims, however, might infringe the claims of the earlier patent.

Some people may have a dilemma about patenting in the field of human health. Should one allow science or technology that pushes forward research in human health to be put into the public domain and therefore available simultaneously to many people? Or should one patent the invention and make it available only to those who can pay? Possibly two pathways are available to the original inventor. If the original inventor in an emerging technology area does not obtain patent protection, he or she may be prevented to practice their own invention by later patents allowed in the same area by someone else. A case in point occurred in 2006 when S. Yamanaka, a stem-cell researcher at Kyoto University, created the first iPS cells.⁵ By introducing just four genes into mouse tail cells grown in a lab dish, he could produce cells that looked and acted like ES cells. These new cells were called induced pluripotent stem (iPS) cells. Kyoto University fast-tracked the Japanese patent application on the method covering the discovery of four genetic factors to reprogram the cell. This patent was eventually allowed and gave Yamanaka the right to carry out his own research. A patent normally gives the inventor the right to exclude others to practice the invention. However, since the method was the first of its kind and there was no close *prior art*, Yamanaka can practice his own invention. Therefore, if you have a novel invention and the novel invention represents a paradigm shift in science or technology, you are the dominant intellectual property holder and can practice the invention. It pays to be first with novel technology because there is no prior art references (including patents). The second pathway for the original inventor is to publish the invention in a scientific article. This pathway would allow everyone to practice the discovery. In later chapters, keywords such as *allowed patent*, *definition of a patent*,

prior art, and *method patent* will be discussed in more detail.

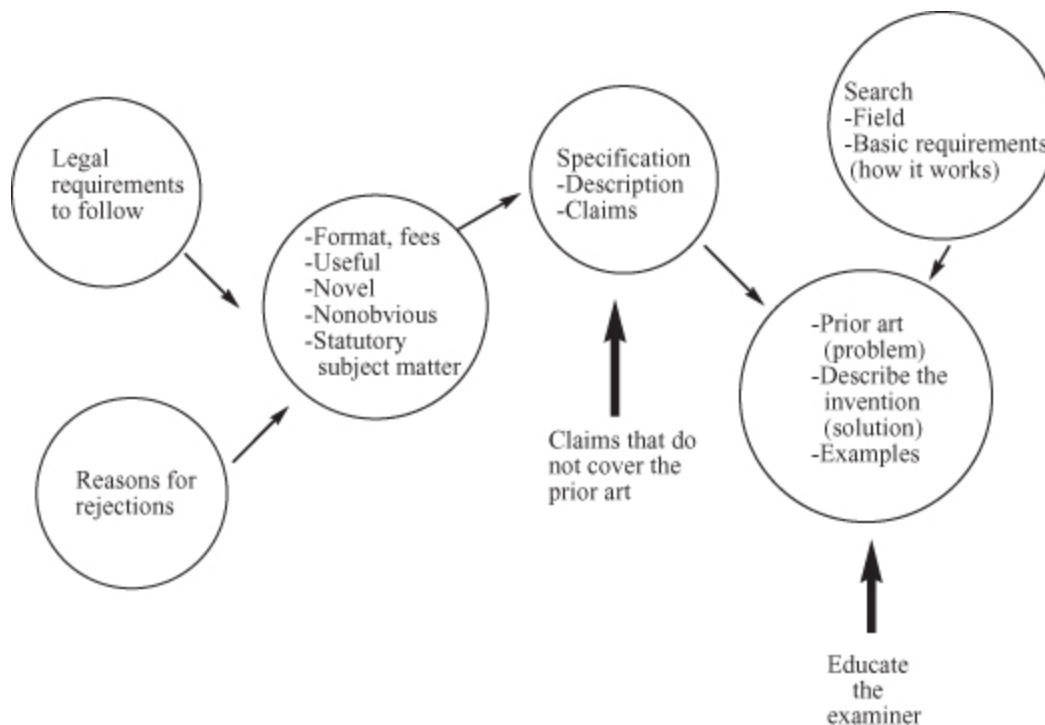
As an intellectual property writer, it is important for you to understand that intellectual property is worldwide. Patents, copyrights, and trademarks are being applied for every day. Science and technology normally move at a rapid pace. Rapid advancement of science should encourage you to act quickly to file your own patent applications, submit a copyright on original tangible works, or obtain a trademark that distinguishes your product from another product. As an example, the number of U.S. patents for technologies from India increased more than 10-fold from 1993 to 2003. One fifth of all U.S. chemical patents were granted to Japanese inventors during roughly the same time period. In 2007, about 8% of inventors were identified as having a Chinese surname. The reason for being aware of these facts is that many inventors file patent applications in their own country and in the United States. Later in the book we'll discuss worldwide prior art searching, but for now simply be aware that you must examine all printed information pertaining to the technology field that is covered by your invention. Printed information includes not only where it is published but also in any language. The same would apply to information that has a copyright. The expression of words on some tangible medium can occur anywhere in the world. Consider when you use Google® to search a topic to find out what has been written about it. The number of worthwhile hits sometimes is staggering.

BOOK STRATEGY FOR PATENTS

Figure [1.1](#), shows the basic elements one must comprehend before writing a patent application; these elements will be covered in later chapters. The written patent application or specification is made up of two parts: invention description

and claims. The claims must be valid and nonobvious over the prior art. The description must disclose your invention adequately and enable a skilled artisan to make and use your invention. There are also a series of legal requirements you must follow. These include following proper format; paying required fees; and ensuring that the invention is useful, novel, nonobvious, and belongs to a statutory class eligible for patent protection. Not following or proving the legal requirements to the patent examiner will lead to a rejection. As we begin to discuss various aspects of patents in later chapters, reflect back on Figure 1.1.

Figure 1.1. Basic elements for a successful patent application.



A BRIEF HISTORY OF PATENTING

Patent laws were first established in the United States in 1790. Patent numbering started in 1836. Early on in patent history, a working model of an invention was required when

you filed a patent application. Luckily, this requirement was dropped several years later. The U.S. Constitution gives Congress the power to enact laws relating to patents. Under this power, Congress has enacted laws relating to patents up to the present time. For example, in 1980, the Bayh-Dole Act gave universities title to ownership of inventions resulting from research funded by the federal government. Before that time, title belonged to the government. In 1984, the Hatch-Waxman Act was passed. This act allowed generic drugs to enter the marketplace. Before 1984, generic drugs were not very common. After 1984, the generic drug company was required only to demonstrate bio-equivalency of the generic drug. In addition, the generic drug company receives the benefit of clinical trial data from the drug company. In return, the drug company received a maximum of up to a 5-year extension on the patent life.

The first historical reference to a body responsible for issuing and archiving patents goes back to 1679, with the creation of the General Board of Trade and Currency of Spain. This board had the responsibility of increasing economic growth. Invention rights in Spain, however, were granted before 1679 by the king of Spain in the 15th and 16th centuries.

Recently, there has been a lot of discussion on the question of whether assessment of damages in patent infringement cases should be based on the extent to which the most recent patent improves on the previous patents. Presently, there is not a limit on damages. For example, if your invention is a novel light-emitting organic or polymer material used in a light-emitting diode (LED) that is part of an HDTV set, should you receive damages on the light-emitting organic or polymer material or the whole HDTV set, which is made up of many interacting components that are functionally different? Damages now are based on the whole HDTV. Patent lawsuits have increased substantially in the

last 20 years (Table [1.1](#)). There was an increase of 63% from 1986 to 1996. The next 10-year period shows an increase of 54%. In 2006, there were approximately 2800 lawsuits in U.S. courts. Again, this reflects the many products in the marketplace worth billions of dollars. This is not to say that some of the litigation originates from companies or individuals with other agendas. An example is *patent trolls*. These are companies or individuals who buy patents from other companies or individuals with the purpose of not making any particular product but to extract royalties or be awarded damages when their patent claims are infringed. Many times these are frivolous lawsuits that may be cheaper to settle out of the U.S. court system. The patent trolls however, also have the financial and human resources to file their own patent applications on products or methods, again with the same objective of finding companies that infringe their patent claims. This example should put into perspective that it is very important to have a patenting strategy when you are nearly ready to launch a new commercial product. A well-thought-out patenting strategy may make it more difficult for patent trolls to have a negative impact on your new commercial product. A brief discussion about patenting strategies is found in Chapter 12.

TABLE 1.1 Patent Lawsuits

Year	Number of Lawsuits	10-Year Percent Increase
1986	1,129	—
1996	1,840	62.9
2006	2,830	53.8

INTELLECTUAL PROPERTY: IS IT IMPORTANT OR NOT?