

# Invention Analysis and Claiming *A Patent Lawyer's Guide*

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*For my family*



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Don Snedeker was my first mentor. Don showed me how to write a structured patent application—one that uses consistent terminology to tell the invention story in a logical sequence and leave no doubt as to what the inventive concept is. And Don's clear, direct writing style served as a model that I still struggle to emulate.

My across-the-hall neighbor in those early Bell Labs years was Roy Lipton—an attorney's son who became an attorney's attorney. I can see him still, chair canted back on two legs against my office wall, one hand hooked under the seat, the other, outstretched, holding a yellow legal-size sheet containing a freshly typed claim proffered for comment by a neophyte yearning to be just like him. Roy's greatest gift to me was his jurisprudentially focused approach to patent prosecution. "Jurisprudentially speaking" has become a favorite expression of mine that a former colleague has said that he misses hearing me say. I know the feeling. Hardly a day goes by that I don't think back wistfully to the innumerable "jurisprudentially speaking" discussions I had with Roy.

My later career was nurtured by AT&T's Patent Counsel, John McDonnell. The idea of defining the invention in a single sentence—the problem-solution statement that informs so much of this book—was something I learned from John. And it was he who entrusted me with

many high-visibility projects and later promoted me to a managerial position at Bell Labs.

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## ABOUT THE AUTHOR

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Ronald D. Slusky is a patent attorney in private practice in New York City. He previously was in-house counsel at Bell Laboratories—originally a unit of AT&T and later Lucent Technologies—where he was privileged to mentor dozens of patent attorneys over a career spanning 31 years.

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# INTRODUCTION

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Almost every patent matter—whether involving procuring a patent, licensing the patent, or enforcing it in court—brings up the same fundamental question:

*What Is the Invention?*

The question is simple, but deceptively so, because the answer is sometimes maddeningly elusive. Yet the skill with which the answer is pursued is crucial to maximizing a patent's economic value. A skillfully discerned answer to *What Is the Invention?* results in patent claims that secure protection far beyond the inventor's specific prototype, or "embodiment," to ideally encompass all alternative designs that incorporate the essence of what was invented. By the same token, an incomplete or wrong answer may create loopholes in the patent that allow competitors to incorporate the essence of the inventor's teachings in their own products without infringing the patent.

The difficulty in answering *What Is the Invention?* arises in part because from the patent perspective an invention is not a physical thing but a concept. Even the inventor may not appreciate what that concept is. Scientists and engineers are typically focused on getting some product designed and built, or a material formulated and tested, and getting the thing to market. Abstract notions like "inventive concept" are largely irrelevant to someone charged with working out the bugs, finishing the project on time, and meeting a budget. The task of identifying the inventive concept—answering *What Is the Invention?*—falls mostly to the patent attorney.

This book shows how to capture the inventive concept in the form of a problem-solution statement. This is a sentence of the form:

*The problem(s) of \_\_\_\_\_ is(are) solved by \_\_\_\_\_.*

Here, for example, is a problem-solution statement defining the seminal invention patented by rocket pioneer Robert Goddard.<sup>1</sup> The inventive concept is Goddard's recognition that a rocket could be made to travel further for a given amount of fuel by storing the fuel in a casing separate

from the combustion chamber and feeding the fuel into the combustion chamber as needed.

*The problem of enabling a rocket to carry a large amount of combustible material while keeping the weight of the rocket as low as possible is solved by successively feeding portions of the material to the rocket's combustion chamber from a separate casing containing the supply of combustible material.*

The book then shows how the problem-solution statement can be used as the basis for drafting the patent application's broadest claims. Indeed, an overarching theme of the book is the critical importance of first analyzing an invention from the problem-solution perspective and only then drafting the patent application's claims based on the results of the analysis. For example, the above problem-solution statement for Goddard's invention is readily transformed into the following claim:

A rocket apparatus having, in combination, a combustion chamber, a casing containing a supply of combustible material, and means for successively feeding portions of said material to said combustion chamber.

Indeed, virtually every topic in this book—from identifying the invention and its fallback features; to drafting claims of varying scope that define the invention and its features; to preparing the specification; to amending the claims during prosecution—is directly or indirectly informed by the problem-solution paradigm.

## Summary of the Book

This book is presented in four parts.

### Part I—Identifying the Invention

We see in Part I how to identify the inventive concept and how to develop a problem-solution statement as broad as the prior art will allow. Also presented is the use of the problem-solution paradigm to identify the invention's fallback features—features of the inventor's embodiment(s) that can serve as the basis for patentability if prior art that comes to light after the patent application is filed reveals that the invention is narrower than originally thought. The fallback features inform the patent application's intermediate- and narrow-scope claims developed pursuant to what the book calls the Planned Retreat.

## **Part II—Drafting Individual Claims**

Having identified the invention and its fallback features, we are ready to draft claims that define them. Part II presents two basic techniques for drafting claims to the broad invention, both based on the problem-solution statement. The first of these is problem-solution-based claiming. Here a claim is derived directly from the problem-solution statement, with very little being added or taken away. The second technique is inventive-departure-based claiming. This approach also relies heavily on the problem-solution thought process, but is more open-ended. The claim drafter is set free to bring creativity to bear, allowing a wide range of claim structures and ways of expressing the broad invention. Part II also presents various types of intermediate- and narrow-scope claims, including claims in dependent and independent form. These include claims directed to the fallback features, claim differentiation claims, independent embodiment claims, and maximized royalty base claims. Such claims implement the Planned Retreat, and they serve other functions as well. Definition claims, which function to define terminology used in their parent claims, are also presented. Finally, Part II shows how best to arrange dependent claims within a given claim family.

## **Part III—The Claim Suite and the Anticipated Enforcement Scenario**

It is not enough to be able to draft claims in isolation. The patent application's overall claim suite needs to be assembled with the anticipated enforcement scenario in mind. Even in the hands of a skilled attorney, the patenting process is fraught with uncertainties. Prior art that lies undiscovered until after the patent issues may render some or all of the patent's claims invalid. Changes in the direction of technology may render some or all of the claims irrelevant to the marketplace.

Part III shows how to assemble an overall claim suite in a way that anticipates and addresses those uncertainties. We see, for example, that the claim suite should include claims defining the invention in all of its commercially significant settings. A video encoding invention, for instance, should be claimed in both the encoder setting and the decoder setting. Most, if not all, of the claims should capture the activities of individual (as opposed to co-acting) direct infringers. The invention should be claimed in all the appropriate statutory classes, which often means both as a method and as an apparatus. The claim suite should also have as much diversity as possible. This means that the invention is defined using, for example, different claim formats and varying terminology or with the claim elements presented in a different order. Diversity in the claim suite addresses the possibility that any one claim may contain an

unappreciated infringement loophole, or may be declared invalid based on prior art or indefiniteness, while another claim may not.

### **Part IV—Preparing and Prosecuting the Patent Application**

The problem-solution paradigm informs not only the preparation of claims but the drafting of the specification and prosecuting of the application in the Patent and Trademark Office. We see in Part IV how the problem-solution statement can serve as the backbone of an effective, story-telling patent specification. It describes how the problem-solution paradigm can be used to amend claims in the most effective way. Part IV also discusses how practitioners can make best use of their most important information resource—the inventor.

### **Invention Examples**

Patent attorneys like to make up technology to illustrate patent law principles. The author recalls, for example, Professor Irving Kayton using the “discovery” that ketchup applied to a bald head can promote hair growth to illustrate the point that one can patent a new use for an old substance.

In that spirit, the author has taken the liberty of making up a few things here and there. The inventions are real—among them the chair, paper clip, microwave oven turntable, traffic signal, and backspace key. Some of the examples, however, make possibly incorrect assumptions about what the prior art was when those inventions were made. That lack of historical accuracy is hopefully compensated for by the pedagogical value of the examples.

### **Terminology Conventions**

The book uses the following terminological and typographic conventions:

Competitors	Others who may practice an invention are referred to as the patent owner’s “competitors” even though the patent owner may not have any intention or ability to practice the invention himself and, if so, does not have competitors.
Inventor	An invention is often made by two or more “joint” inventors. For simplicity, this book always uses the singular form.
Embodiment	Although the inventor often devises multiple embodiments, the book often uses the singular form.



His/Her	Feminine pronouns are used when referring to the inventor and masculine pronouns for patent attorneys and other <i>dramatis personnae</i> .
Specification Sections	For readability, initial capital letters are used when referring to the main sections of the patent specification, viz., Background, Summary of the Invention ("Summary") and Detailed Description.
Claim numbers	Claim numbers in patents are sequential integers, but for ease of reference, claims are denoted 1.1, 1.2, . . . in Chapter One, 2.1, 2.2, . . . in Chapter Two and so forth.

### Reading and Using This Book

This book can be read and used as a reference work. The various sections are fairly self-contained, and liberal cross-referencing enables the reader interested in a particular topic to come on board with any terminology or concepts that might have been introduced earlier.

The book was also designed with another use in mind. Much effort was invested in producing a work that both the new and experienced practitioner could—and would want to—pick up and read from start to finish. The topics build on one another in a logical sequence and with as much of a narrative arc as was possible to provide in a book of this type. The book endeavors not to be simply a compilation of information, but to mentor the reader in an overall approach to analyzing inventions, to discovering the inventive concept and its features, and to then define them in a comprehensive and sophisticated set of claims.

Beyond the claims, the principles presented in this book enable the patent practitioner to prepare a pedagogically satisfying patent specification. Armed with a fully thought-out answer to the question *What Is the Invention?* the practitioner finds that the narrative flow takes on a certain single-mindedness as the writing proceeds and a convincing invention story emerges. It is easier to get everything down in the right sequence and at the right level of detail. It becomes clear what is to be put in and what left out. Less editing and rearranging will be required. The claims will almost write themselves. The overall task becomes pleasurable and satisfying, giving the attorney impetus to work in a concentrated, productive fashion.

Most importantly, the principles presented in this book enable the practitioner to produce a superior product.

For the inventor, that superior product is a patent specification that tells a convincing invention story and effectively showcases the inventor's

contribution to the art. For the patent owner, it is a claim suite that broadly and precisely answers the question *What Is the Invention?* and thereby maximizes the economic value of the issued patent.

And for the patent attorney, it is a legal task whose completion produces those feelings of well-being and satisfaction that come from a job well done.

### **Note**

1. United States Patent No. 1,103,503.

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P A R T   I

*Identifying the Invention*



## Introduction to Part I: Identifying the Invention

PART I—*Identifying the Invention*—takes as its central premise that an invention is not a thing, but a concept. We have to know what the inventive concept is to be able to reliably draft claims capturing the invention at its full breadth.

CHAPTER ONE introduces the notion of inventive concept, taking as its example the ballpoint pen, patented in 1888. Also introduced is the idea that the most effective route to the inventive concept is a process that moves forward from the problem the invention solves to identify the inventive solution, not backward from the inventor's specific embodiment(s).

CHAPTER TWO expands upon this concept. It uses the paper clip to illustrate how things can go quite wrong if the analysis of an invention is embodiment-based rather than problem-solution-based.

CHAPTER THREE focuses in on the centerpiece of problem-solution invention analysis—the problem-solution statement. A problem-solution statement is a definition of the invention setting forth the problem the inventor sought to solve and the inventor's solution to that problem in terms that are as broad as the prior art will allow. The problem-solution statement provides a foundation for the patent application's broadest claims, as presented in Part II of the book.

CHAPTER FOUR offers ways of analyzing the invention to ensure that the problem-solution statement is not unduly narrow, while CHAPTER FIVE presents the opposite side of the coin. It discusses how we can determine when a problem-solution statement is too *broad* and how it can be narrowed without being made too narrow. The techniques discussed in these two chapters can also be used when drafting claims.

CHAPTER SIX introduces the concept of the Planned Retreat. The metaphor of the Planned Retreat is a strategy for identifying and prioritizing the invention's fallback features. These are aspects of the inventor's embodiment(s) that can serve as a basis for patentability if what we thought was the broad invention turns out to be in the prior art.



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## CHAPTER ONE

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# Inventions Are Concepts

For most people, an invention is something tangible. One thinks of mechanical devices like the zipper or manufactured substances like tetracycline. Even process inventions, like pasteurization, evoke the physical reality of the milk being heated.

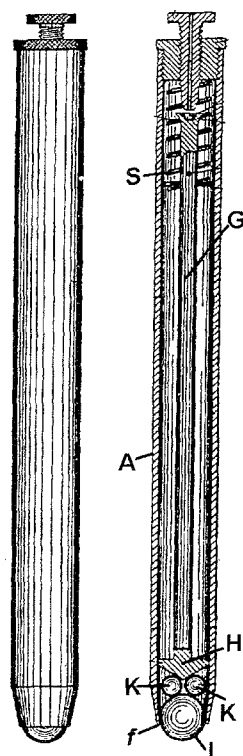
For patent lawyers, however, an invention is not something physical, but a concept. Indeed, in his 1933 book *Double Patenting*, patent law author Emerson Stringham goes so far as to state that an invention is an abstraction:

The difficulty which American courts . . . have had . . . goes back to the primitive thought that an "invention" upon which the patent gives protection is something tangible. The physical embodiment or disclosure, which, in itself is something tangible is confused with the definition or claim to the inventive novelty, and this definition or claim or monopoly, also sometimes called "invention" in one of that word's meanings is not something tangible, but is an abstraction. *Definitions are always abstractions.* This primitive confusion of "invention" in the sense of physical embodiment with "invention" in the sense of definition of the patentable amount of novelty, survives to the present day, not only in the courts, but among some of the examiners in the Patent Office [*emphasis added*].<sup>1</sup>

There is no possibility of clear thinking, says Stringham, until it is understood that an invention as protected by a patent is an abstraction.

Patent practitioners refer to that abstraction as the "inventive concept."

The patent attorney's primary mission is to discover the inventive concept underlying the inventor's embodiment, and then to capture the inventive concept in the patent claims. To fail in that mission is to open the door for a competitor to take advantage of the inventor's contribution to the art while avoiding liability under the patent.



**FIGURE 1-1 John  
Loud's ballpoint pen.**

This chapter uses John Loud's invention of the ballpoint pen, patented in 1888,<sup>2</sup> to illustrate the idea of inventive concept. Loud's embodiment is shown in Figure 1-1.<sup>3</sup> The ball L is held against the contracted mouth *f* of tube A by spring S, which pushes against rod G, bearing H and anti-friction balls K. The spring yields when the ball is pressed against paper, thereby regulating the flow of ink onto the ball and from there onto the paper as the pen is moved.

Claim 1.1 defines Loud's pen:

**1.1 A pen comprising**

- a tube having a contracted mouth and adapted to hold ink,
- a spheroidal marking point projecting from the mouth, and
- ink regulating means for resiliently holding the marking point against the mouth.

This claim seems pared down to the absolute minimum. Desirably, the claim even reads on the pen empty of ink since the claim calls for a



tube adapted to hold ink, but does not recite the ink as an element of the claimed combination. As such, the claim reads on pens in their manufactured form and could be asserted against manufacturers who might have sold the pen without ink, like fountain pens of the day.

Yet claim 1.1 would be of little value if Loud's patent were still in force. Modern ballpoint pens do not have anything like Loud's "ink regulating means for resiliently holding the marking point against the mouth." Instead, the ink is kept from leaking out by virtue of a tight fit between the ball and its socket and by using an ink having just the right level of viscosity.

Granted, it would have required a visionary of considerable insight to have anticipated the advent of the technology required to manufacture today's modern ballpoint pens. However, it does not require a visionary to recognize that advances do occur. Indeed, the patent attorney's task is to draft claims that preserve a patent's value *despite* such advances if improved devices embody the inventor's original work.

Loud's attorney, William Dowss, was in fact up to the task. Claim 1.1 and its "ink regulating means" is not Dowss's claim, but was written for this example by the author. If the Loud patent were still in force, Dowss's claims would command a royalty for every ballpoint pen on the market because Dowss successfully isolated—in a ten-word claim—the concept that underlies every ballpoint pen:

1.2 A pen having a spheroidal marking-point, substantially as described.

That's it! A pen having a spheroidal marking-point. A pen cannot be a ballpoint pen without one. Another claim in the Loud patent is similarly terse.

1.3 A pen having a marking sphere capable of revolving in all directions, substantially as and for the purposes described.

There are myriad different ballpoint pens on the market. Yet each implements the concept that Loud was the first to embody in a pen and that Dowss was skilled enough to claim. Loud's embodiment did not have a replaceable cartridge, a plastic barrel or a retractable tip. The technology needed to create the tiny balls and tight-fitting sockets used in modern fine-line ballpoint pens probably did not exist in 1888. Today's metals, plastics and ink compositions were not available. Nonetheless, every ballpoint pen produced since Loud's original embodies a concept that transcends these embodiment details—the concept of a pen "having a spheroidal marking-point."

It is easy enough now to recognize the shortcomings of claim 1.1. But how would one know that it is not the broadest definition of the invention? It is the rare invention that can be claimed in as few words as claims 1.2 and 1.3, and therefore a claim even as short as claim 1.1 would seem to be quite broad. How did patent attorney Dowss have the insight to foresee in 1888 that future pens would not need claim 1.1's spring-loaded "ink regulating means?"

Dowss may not have had that insight. But Dowss's claims clearly evince his understanding that implementational details—like an "ink regulating means" or a tube with a contracted mouth—were irrelevant to the essence of Loud's invention.

How did Dowss come to that understanding? And how can the practicing patent attorney today know when the inventive concept has truly been found and properly claimed?

The answer to that question is an approach to invention analysis that lies at the heart of this book.

### **Begin from the Problem**

The path to the inventive concept begins with the problem that the inventor solved. The inventive concept is the inventor's solution to that problem, when broadly articulated at a conceptual level. Given any detail in the inventor's embodiment—a physical element, a method step, a particular functionality or a specific relationship among these—one can ask whether that detail is essential to solving the problem to at least some extent. If not, that detail is not intrinsic to the inventive concept.

The problem Loud addressed was that existing (fountain and quill) pens could not write on rough surfaces, such as wood or leather. Central to his solution is the ball itself. Problem solved. Claim 1.1's "ink regulating means" tells how such a pen could be constructed, not about how the problem of writing on rough surfaces can be solved. If the ink could somehow regulate itself, we would still have a pen of the type Loud envisioned. Never mind that Loud probably never considered whether such an ink could exist. It is possible to formulate a statement of something new—a pen with a spheroidal marking-point—without having to describe how such a pen might be constructed.

Perhaps somewhat more subtle is the question of the contracted mouth of the pen barrel, which one might think is absolutely required. How else could the ball be held in place?

It doesn't matter.

Imagine a tiny genie whose job is to hold the ball in place. Loud's spheroidal marking-point pen would still be a novel writing implement, even with that genie hanging on for dear life as the pen wiggles across

the paper. Distinguishing Loud's pen from those that came before does not require the pen to have a contracted mouth or an ink regulating means. Advantageous or not, these are only implementational details not going to the essence of solving the problem of writing on rough surfaces.

Dreaming up what the book calls "far-fetched embodiments," like this genie, is a powerful invention analysis tool. See p. 35.

It is sometimes thought there is no harm in including an implementational detail in an invention definition if the detail is absolutely needed to implement the invention. This is a dangerous view to take. We can never be certain that any particular detail always *will* be needed. Technology marches on. New ways of doing things are invented every day.

Moreover, whether something seems required to *implement* an inventive concept is irrelevant to the task of *claiming* it. No argument in this regard from the Patent Office of 1888. The Office issued Loud's patent with claims 1.2 and 1.3 just as presented above. Indeed, upon eliminating the "substantially as described" construct not used in modern practice, and assuming that ballpoint pens had not yet been invented, those same claims would be patentable today.



Inventive concepts underlie every kind of invention, not just mechanical devices like ballpoint pens. Appendix A presents a number of them, including such pioneering inventions as Birdseye's method for packaging frozen food, Camras's technique for magnetic recording and L'Esperance's laser vision surgery.

It is no surprise that such breakthrough inventions can be articulated broadly and claimed tersely. But week in and week out the Patent and Trademark Office issues patents with similarly broad claims that are directed to more modest advances. Appendix A provides examples of these as well.

## Notes

1. EMERSON STRINGHAM, DOUBLE PATENTING (Washington, D.C.: Pacot Publications, 1933).
2. U.S. Patent No. 392,046 (issued Oct. 30, 1888).
3. Loud's embodiment was not practical. A Hungarian journalist named Laszlo Biro is credited with having invented the modern ballpoint pen in 1938.



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## CHAPTER TWO

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### Begin from the Problem (Not the Embodiment)

The problem-solution approach illustrated in Chapter One for the ball-point pen is summarized by the prescription *Begin from the Problem (Not the Embodiment)*. That prescription should be followed in the analysis of every invention.

This chapter uses the invention of the paper clip to illustrate in greater detail what can go wrong if the analysis begins from the embodiment rather than the problem and how beginning from the problem can improve the odds of capturing others' products that implement the inventor's teachings.

#### What Is the Problem?

Build a better mousetrap, it is said, and the world will beat a path to your door.

It rarely happens.

Consider the mousetrap itself. Only a few kinds of mousetraps are found on store shelves, even though hundreds of mousetrap designs have been patented over the years, and even though each is "better" in *some* way. Even the best idea is unlikely to achieve commercial success unless midwived into the marketplace through attractive pricing, concerted marketing, and effective advertising. Contrary to the expectations of many first-time patentees, obtaining a patent is rarely the end of a process; it is usually only a beginning.

Yet the invitation to build a better mousetrap embodies the important idea that a good invention solves a problem that its predecessors solved less well or not at all. Not merely different from the prior art, a good invention corrects for some deficiency in it. For example, some people find the standard spring-loaded mousetrap hard to set. Others recoil from its violent nature and don't like having to look at the dead mouse, preferring to trap the mouse alive and release it outdoors. The few "better"

mousetraps that have enjoyed marketplace acceptance have done so by addressing one or more such problems.

Answering the quintessential patent question posed in the Introduction—*What Is the Invention?*—therefore, requires answering the question *What Is the Problem?* Until the problem is fully appreciated, the solution cannot be fully appreciated either.

Not all practitioners begin from the problem. Many attorneys are taught to begin by focusing on the solution—the specific embodiment that the inventor designed. Typically a claim to the embodiment is drafted. The claim is then progressively broadened through a process of “pruning and distilling.” Terms that are narrow are made general. For example, “screw” becomes “fastener.” Separately recited physical elements or method steps are coalesced into more all-encompassing elements or steps. For example, the dual steps of “pointing [to an icon]” and “clicking” are distilled into the single step of “selecting.” Other limitations are removed altogether. Pruning and distilling continue until any further broadening would cause the claim to read on the prior art. That which remains is supposedly the broadest possible claim to the invention. Similar approaches prune and distill a sketch of the embodiment or a list of components or steps, and a claim is directed to what is left.

A claim developed in any of these ways will certainly be broader—and therefore encompass more embodiments—than what was started with. However, the inventive concept may involve functions or relationships not present in the original claim, and it is unlikely that these will somehow find their way into the finished claim. Significant infringement loopholes can result. Even if such inventive-concept-defining functions or relationships are present in the original claim, they may unwittingly be excised during the claim-broadening process if their significance is not appreciated. Like the inhabitants of Flatland,<sup>1</sup> the attorney beginning an invention analysis from the embodiment may become trapped in a limited analytical framework and unable to discern a larger world beyond.

### Object Lesson—The Konaclip Paper Clip

Let us look in detail at an example of how the embodiment-oriented, invention-analysis-by-claim-drafting approach described above can miss the broad invention. We will then see how the broad invention is readily uncovered by following the prescription to *Begin from the Problem (Not the Embodiment)*.

The example is an early form of paper clip, marketed as the Konaclip, shown in Figure 2-1. Among the advantages touted for the Konaclip was the ability to hold a stack of paper securely while being easy to put on and take off without damaging the paper. This was a combination of

properties that had eluded the prior art, exemplified by the Vaaler and Perfection clips also shown in Figure 2-1. The Vaaler clip did provide secure fastening; a corner of the paper stack was woven around and through the clip's overlapping arm portion. However, this was tedious and permanently creased the paper. The Perfection clip was easy to put on and take off. And it was gentle on the paper. But its paper-holding power was quite poor.

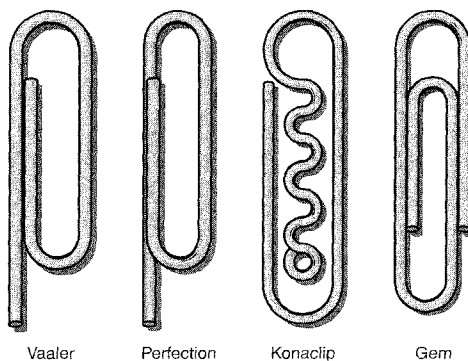
Not that the Konaclip worked all that well either; papers in the middle of the stack still tended to fall out. But the Konaclip did work better than the Perfection clip in that regard and, like the Perfection, did not damage the paper.

Also shown in Figure 2-1 is the now ubiquitous Gem. Although the historical record is not clear, it is assumed for this example that the Gem was invented after the Konaclip.<sup>2</sup>

Our ill-fated invention-analysis-by-claim-drafting approach begins by drafting a claim to the Konaclip embodiment. Claim 2.1 is such a claim. Note how claim 2.1 recites the Konaclip's inwardly deflected leg extending down the middle of the clip. This is the Konaclip's most distinctive physical feature and clearly distinguishes the Konaclip from the prior art Vaaler and Perfection clips.

2.1 A clip constructed of a single length of spring-steel wire bent to form an elongated frame having a pair of opposing rounded end portions, an end portion of the wire deflected inwardly within and near one end of the frame and within the plane thereof, and extended longitudinally along and within substantially the full length of the middle of the clip, the end portion having a serpentine shape and terminating in an eye.

Claim 2.1 is narrower than it has to be. Limitations that have nothing to do with the Konaclip's central leg—the terms “single,” “spring-steel,”



**FIGURE 2-1** The evolution of the paper clip.

and “pair of opposing rounded end portions”—can be pruned out of this claim without causing it to read on the prior art, but while still having a claim that “hangs together.” This is shown by marked-up claim 2.2. Indeed, those limitations also apply to the Vaaler and/or Perfection clips and, as a result, limit the claimed subject matter without helping to distinguish the invention from the prior art.

2.2 A clip constructed of a ~~single length of spring-steel wire~~ bent to form an elongated frame ~~having a pair of opposing rounded end portions~~, an end portion of the wire deflected inwardly within and near one end of the frame ~~and within the plane thereof~~, and extended longitudinally along and within substantially the full length of the middle of the clip, the end portion having a serpentine shape and terminating in an eye.

Still remaining in this claim are various features of the central leg—its serpentine shape, its length, its position within the plane of the overall frame, and the little eye at the end. None of these are necessary to distinguish the Konaclip from the prior art either, since the prior art clips have no central leg whatsoever. Striking those features from the claim makes it even broader while still not causing the claim to read on the prior art, as shown by marked-up claim 2.3.

2.3 A clip constructed of a length of wire bent to form an elongated frame, an end portion of the wire deflected inwardly within and near one end of the frame ~~and within the plane thereof~~, and extended longitudinally along and within ~~substantially the full length of~~ the middle of the clip, ~~the end portion having a serpentine shape and terminating in an eye.~~

Ultimately, then, it is the recitation of the central leg that is extended “longitudinally along and within the middle of the clip” that distinguishes the Konaclip from both the Vaaler and Perfection clips. Claim 2.4 is the final version.

2.4 A clip constructed of a length of wire bent to form an elongated frame, an end portion of the wire deflected inwardly within and near one end of the frame, and extended longitudinally along and within the middle of the clip.

This claim is obviously much broader than the claim we started with. Indeed, claim 2.4 would encompass many Konaclip-like paper clips that differ from the particular embodiment shown in Figure 2-1.



Claim 2.4 does not encompass the later-invented Gem; the Gem does not have the Konaclip's central leg. Yet the Konaclip embodies a concept that carried over into the Gem. The Konaclip patent<sup>3</sup> did not have a claim directed to that concept, but it *could* have, and would have entitled the Konaclip patent owner to a royalty for every Gem sold.

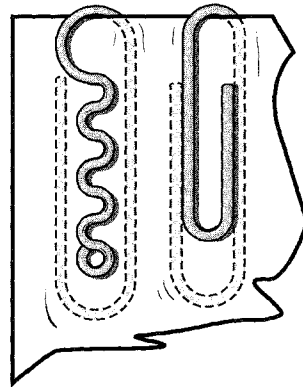
Therein lies the moral of this tale.

The Konaclip's underlying concept readily reveals itself upon application of the rule *Begin from the Problem (Not the Embodiment)*. Recall that the problem the Konaclip was intended to solve was that prior art paper clips were not able to fasten a stack of papers securely without damaging them. What is really going on in the Konaclip in an attempt to solve that problem? A little thought reveals the answer. Part of the clip on one side of the paper urges the paper against a pair of opposing rails of the frame on the other side of the paper. This provides a great deal of frame surface area against which the paper is urged, and to some extent tucks the paper down into the space between the rails. Figure 2-2 shows how both the Konaclip and the Gem incorporate this concept.

Claim 2.5 is a claim drafted with that solution in mind. This claim reads not only on the Konaclip but also on the not-yet-invented Gem!

2.5 A clip constructed of a length of wire bent to form an elongated frame having a pair of opposing rails, an end portion of the wire being disposed inwardly within the frame and in the plane thereof, said end portion being so arranged as to cause a stack of paper inserted between said end portion and said opposing rails to be urged substantially equally against both of said opposing rails.

There is little chance that any embodiment-based analysis of the Konaclip could ever result in claim 2.5. Without first considering what problem the Konaclip was intended to solve and how, broadly and functionally, the problem *was* solved, it is unlikely that words directed to the broad solution would ever find their way into the starting-point claim. Nor is it likely that such words would emerge as the result of any subsequent editing of the claim. Such an analysis is doomed from the start.



**FIGURE 2-2 The Konaclip and the Gem share a common concept that solves the paper-holding problem.**

Claim 2.1 does contain a glimmer of the claim 2.5 language in its recitation that the end portion of the wire is “within the plane” of the frame. However, that language was pruned out of the claim during the broadening process.

Had the Konaclip patent included a claim like claim 2.5, the Konaclip inventor could have collected significant royalties from Gem manufacturers, notwithstanding the commercial failure of his own product. Unfortunately, the Konaclip patent focused solely on the Konaclip’s geometry—its central leg—and not its underlying concept. Thus the potentially valuable Konaclip patent proved to be as worthless as the Konaclip itself.

Scenarios like this are common. All too often, a patent application’s broadest claim arrived at through an embodiment-based analysis falls short of the mark, even when the conceptual underpinnings of the invention were right there, waiting to be discovered. The inventive concept often lies just as close to the surface as in this example, and a problem-solution-based analysis will readily uncover it.

Not that all inventions yield up their inventive essence as straightforwardly as the Konaclip. The subtleties of the concept underlying some inventions can make for a puzzle of Gordian knot proportions. All the more reason to begin from the problem, not the embodiment, if we are to have any chance of consistently capturing the inventive concept.

Pruning and distilling are invaluable tools for improving a claim. But what’s needed in the early going is not a claim-drafting tool, but an invention-analysis tool. Sometimes we can get to where we need to be even when starting out from the embodiment. A perceptive attorney poring over a claim—particularly if helped along by an engaged inventor—may see an initial embodiment-oriented characterization of the invention transformed into an inventive-concept-capturing claim bearing little resemblance to the original. But there is little guarantee of that.



Drafting a broad claim that captures all of the inventor’s embodiments is relatively simple. It is much harder to draft a claim that will capture others’ future products before they have even been designed. Difficult or not, it is a task that must be tackled. We otherwise leave open the possibility that an inventor’s original embodiment will be overtaken in the marketplace by “new and improved” implementations not covered by any claim in the issued patent. The Konaclip example makes that quite evident, as well as illustrating how beginning from the problem, not the embodiment, can help avoid that result.

The next chapter introduces a methodology that, indeed, begins from the problem to identify the broad invention and to define it in a problem-

solution statement. That definition of the invention can serve as the basis for the patent application's broadest claims and, as we will see, the overarching theme of the entire patent application.

### **Notes**

1. As recounted by EDWIN A. ABBOT in *FLATLAND: A ROMANCE OF MANY DIMENSIONS* (New York: Signet Classics, 1984), the inhabitants of Flatland—points, lines, and polygons—know nothing of the third dimension and are baffled by certain phenomena that occur when Flatland is visited by various three-dimensional objects.

2. A fascinating account of the development of the paper clip is presented in HENRY PETROSKI, *THE EVOLUTION OF USEFUL THINGS* (New York: Alfred A. Knopf, 1992).

3. U.S. Patent No. 648,841 (issued May 1, 1900).



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## CHAPTER THREE

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### The Problem-Solution Statement

The centerpiece of problem-solution invention analysis is the problem-solution statement.

The problem-solution statement is a one-sentence statement of the invention. It states as broadly as possible, but without reading on the prior art, (a) the problem the invention solves, and (b) the inventor's solution to that problem. The problem-solution statement can serve as a foundation for the patent application's broadest claims. It is a benchmark against which the entire suite of claims in the patent application can be measured. And it can serve as the backbone of an effective story-telling patent specification.

The problem-solution statement is of the following form:

*The problem(s) of \_\_\_\_\_ is(are) solved by \_\_\_\_\_.*

Here, for example, are problem-solution statements for the ballpoint pen and Konaclip inventions discussed in the previous chapters:

*The problem of a pen being able to write on rough surfaces is solved by the pen having a spheroidal marking point.*

*The problem of securely fastening sheets of paper without damaging the paper and while being able to unfasten the sheets easily is solved by a wire clip bent into an elongated frame having a pair of opposing rails and at least one inner portion within a single plane and arranged such that a stack of paper inserted between the inner portion and the opposing rails is urged substantially equally against both of the opposing rails by the inner portion.*

Appendix A presents more examples, in a variety of technologies.

Some inventions can be broadly characterized in more than one way. We saw this in the case of Loud's ballpoint pen.<sup>1</sup> If differing ways of

characterizing the invention surface as the analysis proceeds, we should consider creating separate problem-solution statements for each. Such alternative characterizations of the invention provide a basis for alternative ways of claiming it.

### **Start Early**

A first draft of the problem-solution statement should be formulated as soon as we have enough information about the problem and the general outlines of the solution to do so. Starting early counteracts the tendency for unessential implementational details to taint our notion of what the broad invention is. It protects us from becoming blindsided by the details and going too narrow right at the outset. Waiting until all the details have been laid out, and then trying to synthesize the invention out of all that, opens the door to an analysis that is embodiment-based rather than problem-solution-based. It is difficult to be misled by what we don't know.

Our introduction to the invention may be a technical paper or other written description supplied by the inventor. In that case, we should have the problem-solution paradigm in mind as soon as we begin to read. As the inventor's exposition unfolds, we mentally separate what seems to be the problem from what seems to be the solution, as well as separating what seem to be implementational details from what seems to be at the heart of the inventive concept. The task is often made easy by an inventor who has had prior exposure to the patenting process and has been inculcated with the problem-solution approach to describing an invention. The inventor's write-up may then quite clearly lay out the problem-solution story, as well as prior attempts to solve the problem and the shortcomings of those approaches. In any event, we should formulate a first version of the problem-solution statement as soon as the information gathered from the inventor's write-up makes it possible to do so—if not on paper in the first instance, then at least in our minds.

Or our introduction to the invention may occur in a face-to-face or telephone conversation with the inventor. Here, again, the problem and solution should be the early focus. The inventor should be set on a problem-solution course, being asked what problem she set out to solve and what she knows about prior art attempts to solve it.

The inventor can then be asked to explain how she solved the problem. A useful way of setting the stage for this is to bring the inventor back in time to the moment of inventive realization and to prompt her to articulate her solution in terms that put a heavy emphasis on function with as few implementational details as possible.

Marla, given the problem that we just talked about, what would you say—in one sentence if you can—is fundamentally at the heart of how you solved that problem? If you can bring yourself back to that moment when you thought you had seen your way clear to a solution, what do you think you realized there at that outset? Taking a sort of top-down approach to what you invented, what do you think is the broadest, most general way you can articulate your solution?

It would be nice if the inventor could thereupon bring forth a broad, elegantly articulated solution, like Athena springing fully formed from the head of Zeus. Occasionally it does happen that way. More typically, however, the inventor picks up her pencil and begins explaining her solution in the context of the embodiment. This is not surprising. Inventors are used to thinking about their work in the tangible realm rather than the conceptual. Nonetheless, given the attorney's exhortation to describe the solution broadly and functionally, the inventor will present it in at least *some* level of generality, which is fine for a start. Techniques for ensuring that the problem-solution statement is as broad as it can be are presented in the next chapter.

The attorney should therefore stay alert for what could be the broad solution and take an initial stab at the problem-solution statement as soon as it appears possible to do so. That initial view of the invention can then be presented to the inventor for discussion.

If the attorney is not familiar with the technology at hand, his initial take on the problem-solution statement can be wildly overbroad. It is nonetheless desirable to start early and aim high even though it may well mean having to fall back to a more limited view of the invention once the full extent of the prior art becomes clear. The alternative of holding back and aiming lower in the first instance may result in an invention definition that is unduly narrow. Having been apprised by the inventor that the proposed problem-solution statement is too broad, the attorney can simply prompt the inventor to pick up the thread of her story, staying alert for an opportunity to formulate a problem-solution statement that is better focused on her contribution to the art.

## Think Big

A companion idea to the prescription *Start Early* is *Think Big*.

Having been exposed to the broad functionality of the embodiment early on in his discussion with the inventor, the attorney who thinks big says to himself, "imagine the value of this patent if only we could capture

the naked notion of *that*,” meaning the broad functionality of the embodiment stripped of its implementational trappings. The earlier in the process we start thinking in these terms, the better.

Imagine the first alarm clock. An embodiment-based analysis of this device would have focused on its various components—an analog clock face, a bell, a hand to indicate the desired alarm time, and so forth. However, an attorney who was thinking big at that time would have been asking himself, “Is it possible that we could get (i.e., claim) the naked notion of alarming at a selectable time? Think of royalties! Think of the market share!” And then, “What’s the prior art? Can it stop us? How can we get around it?” How much easier to capture the alarm clocks of the future—electrical clocks, electronic watches, personal digital assistants, and so on—if the patent is not limited to any particular configuration of the timekeeping device or any particular alarming mechanism.

Or consider the computer mouse. An attorney thinking big would want his client to own the naked notion of random-access control of a display screen cursor. Such a claim would encompass such post-mouse innovations as the trackball, joystick, touch pad or even cursor control with voice commands.

To *Think Big* means not being satisfied to pursue a limited parcel of intellectual property, even though it may be relatively easy to acquire. It means having a persistent, relentless mind-set of trying to secure as expansive a parcel of intellectual property as possible, even though it may be more difficult to do so.

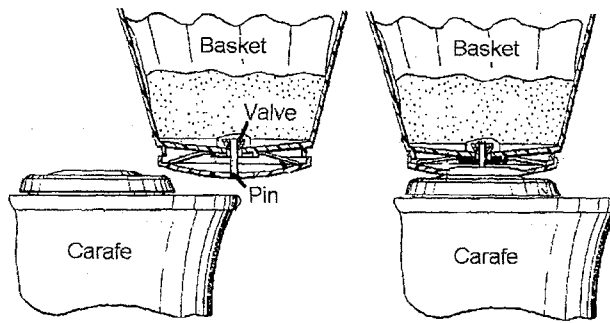
Of course, the problem-solution statement cannot be so broad as to encompass prior art. It would be great to own the naked notion of sending moving pictures over the airwaves, but that idea is already almost a century old. So at some point our grandiose ideas of how broadly the invention can be defined may have to give way to reality.

Better, however, to aim high and have to fall back somewhat than to aim low and achieve a lesser goal, only to realize too late in the game—when others enter the marketplace with a variant of the inventor’s embodiment not captured by the patent’s claims—that more could have been achieved.

### **Don’t Be Misled by the Inventor’s Embodiment Focus**

The broad invention is often some new functionality. How the embodiment implements that functionality is of secondary importance. The inventor may not appreciate the distinction, however, and may lead the attorney to assume that the new functionality is already known in the art. The opportunity to define the inventor’s contribution at its full breadth may then become lost.





**FIGURE 3-1 Coffeemaker with anti-drip feature.**

The attorney can usually forestall such a result by keeping his ears open and, again, starting early and thinking big.

Consider, for example, the drip-style coffeemaker shown in Figure 3-1. When the carafe is not in place, a valve in the coffee basket prevents liquid from dripping out of the brew basket onto the burner or countertop. Sliding the carafe into place pushes up on a pin, which opens the valve and allows coffee to flow. If the carafe is removed, the valve is again closed.

At the time the inventor devised this pin-and-valve design, the broad concept of shutting off the flow of liquid if the carafe is not in place may have been in the prior art. But it may not have been. In that case, the inventor would be entitled to a claim encompassing all ways of confirming the presence of the carafe—a photocell, microswitch, weight sensor, and so on.

Unfortunately, the inventor may describe the problem she set out to solve not as the problem of dripping coffee but the problem of how to shut off the flow. In so doing, she will have relegated her broad invention to the prior art. The attorney is less likely to be misled by such overly narrow thinking by beginning to formulate the problem-solution statement early on. He will then have the opportunity to explore with the inventor whether the invention can, indeed, be as broad as the naked notion of shutting off the flow if the carafe is not there.

### **First Be a Skeptic; Then Be an Advocate**

The previous section describes a situation where the inventor doesn't appreciate the full breadth of the invention. The opposite is also possible. That is, the inventor's view of the breadth of her invention may be overly optimistic. This phenomenon is particularly common with the nonprofessional, armchair inventor who brings to her attorney *only* the very broad idea because the inventor does not have the engineering skills to design an embodiment.

A truism of the patent business is that if a problem is one of long standing, and could have been solved years ago, it probably was! Thus an attorney presented with an invention that solves an old problem and that was readily solvable with old technology should bring a healthy dose of skepticism to the invention analysis process.

Consider, for example, a pager or a cell phone that automatically switches from audible ringing to its vibrate mode when an onboard microphone senses that the ambient noise level is so high—on a busy street, for example—that the audible ringing might not be heard. It's a cute idea. But the problem of not hearing an audio alert in a noisy environment is as old as the pager itself. And microphones tiny enough for sensing the ambient noise level have also been around for a long time. The problem could, therefore, have been solved years ago, and our intuition ought to suggest that this is not a new idea. In fact, it is not.<sup>2</sup>

How about a windshield wiper system that detects the level of precipitation and adjusts the speed of the wipers accordingly? Also an old idea.<sup>3</sup>

This does not mean the inventor should be sent packing based on mere suspicions about the prior art. What it does mean is that a prior art search should definitely be undertaken to either validate or disprove our suspicions.

The role of the attorney as skeptic also extends to the question of obviousness under 35 U.S.C. 103. The attorney's experience may tell him that the invention as broadly presented by the inventor would likely be deemed obvious based on the prior art. The inventor needs to be challenged in such a case to articulate (with the attorney's help, as discussed below) why an invention so broadly defined would not have been so obvious after all.

The point of such skepticism is not to talk the inventor out of seeking a patent, at least not in the first instance. Indeed, the attorney's role is to be the inventor's advocate and help her secure whatever intellectual property protection she is entitled to. The point of such skepticism, rather, is to open a dialog that hopefully will bring to the fore possible arguments *against* the obviousness rejection the attorney believes is likely to come if the present broad view of the invention is maintained.

Thus, once having laid out for the inventor the examiner's likely obviousness rejection, the attorney needs to switch roles and become an advocate *for* the invention. For example, the inventor should be encouraged to identify any incorrect assumptions underpinning the attorney's skepticism, such as the attorney's interpretation of what a particular prior art reference actually says. And the attorney should explore with the

inventor whether any of the case-law-sanctioned indicia of nonobviousness might apply. Among such indicia are

- the modification or combination of prior art references yields unexpected results;
- the state of the art is such as to “teach away” from making the modification or combination of prior art references;
- the existence of so-called secondary considerations, such as long-felt need.<sup>4</sup>

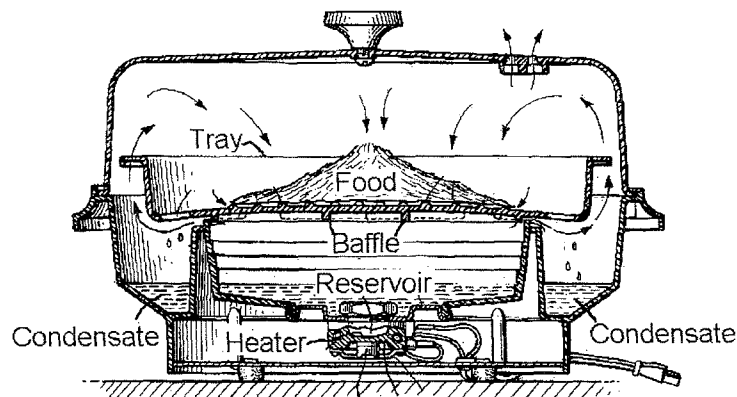
Surprises often await the attorney on these fronts. He is often surprised to hear from the inventor some cogent technological and/or legally sound reasons that the attorney’s initial take on the obviousness question is not as open-and-shut as he thought.

Once it appears that all the relevant prior art is in hand and that at least some reasonable argument can be mounted against any anticipated case of obviousness, the attorney will be in a favorable position to advocate for the patentability of the invention if the expected obviousness rejection is actually made. However, the attorney’s advocative role should be engaged long before that. We will see in Part IV that an artfully crafted patent specification can serve as a powerful vehicle for advocating the patentability of the invention.

### **Keep Separate Inventions Separate**

The broad invention may reside in the fact that two or more solutions have been brought together to achieve some unanticipated synergistic result. However, a device or process may incorporate two or more solutions to respective problems, each being a separate invention (assuming that the requirements of novelty<sup>5</sup> and nonobviousness<sup>6</sup> are met). For example, the food steamer shown in Figure 3-2 solves at least three problems, each solved by a respective feature of the steamer, and each giving rise to its own problem-solution statement:

1. *The problem of foul odors that occur if the steamer is allowed to boil dry is solved by preventing the condensate from draining back to the boiling-water reservoir.*
2. *The problem of the food getting soggy if allowed to remain in contact with the condensed steam is solved by a specially designed food tray that causes the condensate to drain away from the food.*
3. *The problem of long waiting times for initial steam formation to occur is solved by a baffle that promotes local heating of water in the boiling-water reservoir.*



**FIGURE 3-2 A food steamer that solves three problems with three separate solutions.**

Identifying the separate inventions embodied in a particular device, method, or system, and pursuing them in separate patents, may be crucial to securing patents that competitors cannot easily design around. If the patent defines and claims the invention as a combination of multiple solutions to multiple problems, a competitor's product implementing less than all of those solutions escapes scot-free. It is therefore dangerous to lump all the solutions together, and call *that* the invention without thinking through the possible problems that may arise when it comes time to license or enforce the patent. In general, a problem-solution statement should be formulated for each independently novel/nonobvious idea.

### Define the Invention; Try It On for Size

The overall process of formulating a problem-solution statement is summarized by the prescription *Define the Invention; Try It On for Size*.

"Define the Invention" means formulating a problem-solution statement at some level of breadth. "Try It On for Size" means comparing that problem-solution statement to the prior art to determine whether it is too broad, too narrow, or "just right." The problem-solution statement may contain limitations—either in the problem or in the solution—not necessary to distinguish the invention from the prior art. In that case, the problem-solution statement needs to be made broader. Or the problem-solution statement may read on the prior art. In *that* case, the problem-solution statement needs to be made narrower.

The process is iterative. Once having redefined the invention, the new problem-solution statement must itself be tried on for size. A problem-

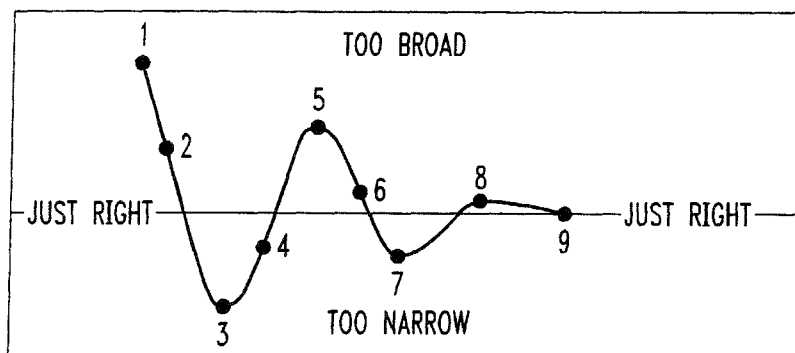
solution statement that was too broad may now be too narrow, and vice versa. In fact, successive versions of the problem-solution statement may cross the line between “too broad” and “too narrow” any number of times until arriving at one that seems “just right.” This is analogous to adjusting a camera’s focus or its zoom back and forth in smaller and smaller steps until the image is perfectly defined. This dynamic is evident in the author’s “real time” analysis of the backspace key presented in Appendix B.

Effective invention identification means getting a good handle on the prior art as soon as possible. We otherwise run the risk of “running with” a problem-solution statement that is too broad. This can mean additional time and expense to reconfigure the patent application and its claims, assuming the undue breadth comes to light before the patent application is filed. And if anticipatory prior art comes to light later, during prosecution, we may be faced with an application that does not effectively advocate or adequately disclose the “real” invention.

It may be feasible for the attorney and inventor, while the two of them are together, to conduct an online prior art search at the United States Patent and Trademark Office (USPTO) website or at a commercial search site. Even if a prior art search was already undertaken, or the inventor is confident that she is already aware of all the relevant prior art, questions of further prior art that may be “out there” may arise after the problem-solution statement has been worked on and broadened. An updated search may then be appropriate.

The attorney/inventor team will have done a lot at their first (and perhaps only) meeting even if they accomplish nothing more than produce a finely honed problem-solution statement and identify the invention’s important fallback features.<sup>7</sup> Getting the inventive concept locked down early paves the way for an efficiently written and sharply focused patent application.

Many practitioners like to sketch out at least one set of claims at the first meeting. This is fine as long as it is done after a problem-solution-based analysis has been undertaken. Drafting claims should not be the primary vehicle for discovering the invention. The structural formalisms of claim drafting, while perhaps familiar and facilitating, can all too easily mislead us into thinking we have discovered the inventive forest when we have actually only identified some of its trees. Drafting a claim without having analyzed the invention is like drawing a map without having first surveyed the terrain. The Konaclip example presented in Chapter Two should have convinced the reader of the importance of analyzing first, and claim drafting second.



**FIGURE 3-3** Formulating successive definitions of the invention and trying each one on for size is like adjusting a camera's focus or zoom back and forth in progressively smaller steps.



A fundamental patent-drafting skill is the ability to evaluate an invention definition—be it in the form of a problem-solution statement or a claim—and to decide whether it is too broad, too narrow, or “just right.” The reader will be helped in developing that skill by the material in the upcoming two chapters.

### Notes

1. See p. 7.
2. U.S. Patent No. 5,646,589 (issued July 8, 1997).
3. U.S. Patent No. 5,949,150 (issued Sept. 7, 1999).
4. An enumeration of some of the indicia of nonobviousness is provided in *MANUAL OF PATENT EXAMINING PROCEDURE*, § 2145, ¶ X (8th ed., rev. 2, May 2004).
5. 35 U.S.C. 102.
6. 35 U.S.C. 103.
7. See Chapter Six, pp. 53–64.

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## CHAPTER FOUR

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# The Problem-Solution Statement— Reaching for Breadth

The prescriptions *Start Early* and *Think Big* presented in the previous chapter give us a good start in making the problem-solution statement, and ultimately the claims, as broad as they can be. This chapter presents a number of other prescriptions and ideas that can be brought to bear in that quest. These techniques can be applied in the very earliest stages of our thinking, even before the first draft of the problem-solution statement has been committed to paper. They can also be used later on, when the problem-solution statement is being tried on for size in the search for loopholes.

The problem-solution statement will serve as the basis for some of the patent application's broadest claims.<sup>1</sup> However, the ideas in this chapter can also be used when drafting claims directly.

### Envision the “Opposing Team”

True or false? In characterizing an invention, one should try to capture the inventor's contribution to the art.

The answer would certainly seem to be “true,” but it is not the complete answer. The value of a patent is not determined by how cleverly or well its claims define the product or method that the inventor designed. A patent is valuable when its claims read on what somebody *else* will market or, at least, *would* market but for the existence of the patent. If it is expected that competitors will slavishly “knock off” a copy of the inventor's marketed product, there is no real issue—almost any claim will do. But that rarely happens. More often a competitor implementing the essence of the inventor's teachings does so in a way that departs significantly from the inventor's design.

Thus when we are drafting the problem-solution statement—which will serve as the basis for the patent application's broadest claims—the appropriate mind-set is not one of defining what our inventor has done. Rather, our mind-set needs to be one of defining what some competitor



**FIGURE 4-1** The Opposing Team scrutinizes every word as the prosecuting patent attorney writes it, waiting for him to create an infringement loophole.

may do that *takes advantage of* what our inventor has done—particularly a competitor who is intent on doing so while avoiding the claims of our inventor's patent.

A powerful way of putting ourselves in that mind-set is to conjure up the image of a potential infringer and his patent attorney. The book refers to them as the "Opposing Team." These adversaries will be poring over the claims after the patent issues, looking either for limitations that their product does not meet or for some way to redesign the product to that end.

At the very same time, then, that we are formulating a problem-solution statement or a claim, we should imagine ourselves to *be* the Opposing Team. As each word, phrase, and structural element appears on the screen or our yellow pad, we should try to think of a way around it, just like the real-life Opposing Team will do. Indeed, the author often has a sense of the Opposing Team standing over his shoulder at the word processor, watching for something to appear that will make it possible to design around the issued patent or argue that their product does not infringe.

This constant awareness of the Opposing Team enables us to serve as our own worst critic or perhaps, one might say, our own *best* critic. It helps us become aware of unduly limiting aspects of the problem-solution statement in real time so that problems can be fixed as they arise.

Taking on the Opposing Team's mind-set can also help us identify potential arguments that the problem-solution statement is too broad or ambiguous, rendering any claims that may be based on it unpatentable (pending claim) or invalid (issued claim).

The inventor should also be made aware of the Opposing Team—if not by name, at least in concept. When first drafting or later editing the problem-solution statement or a claim, we can emphasize to the inventor that the goal is to define the inventive concept in a way that precludes a motivated competitor from "ripping off" the invention. The inventor can be encouraged to help think about how the invention might be appropriated by a competitor without coming within the ambit of the current problem-solution statement. Inventors are often captivated by the puzzle-like aspect of this challenge and find loopholes that the attorney might never have seen on his own.



One of the author's colleagues puts it this way:

Once I believe that I understand the invention's kernel, I challenge the inventor by asking questions like: "You say that the invention requires  $x+y+z$  at a minimum. If you were to find someone building  $x+y$ , but not using  $z$ , would you feel upset that this someone can do it without paying you a royalty?" This, in my experience, very quickly causes the inventor to think about how this "someone" will try to get away with using the invention without using some of what the inventor thought was necessary in the presented embodiment, and focus on the kernel of the invention.

—HTB

Another of the author's colleagues analogizes the Opposing Team to a computer hacker. Although his description speaks in terms of analyzing a claim, the idea applies equally well to the problem-solution statement.

I approach claim analysis much as a hacker approaches systems analysis. Although people usually look at a system from the standpoint of what it does *right*, a hacker looks at the edges to see what it does *wrong*. Thus, my mindset when drafting claims is that of a person skilled in the art who reads the specification and then tries to extract commercial value from its teachings while skirting the boundaries of whatever has been claimed. I ask myself what would I do/build/argue to get around any claim, regardless of how well drafted, if I were a commercial competitor (or his shrewd lawyer). In this sense my claim drafting tends to have a pessimistic, or at least a very defensive, bent.

I tend to work in a constant feedback loop on every claim limitation that suggests itself to me, trying to understand how each limitation poses a "vulnerability"—an infringement loop-hole—within the context of the setting at hand.

—BSL

In short, the patent attorney endeavoring to further his client's interests is aided in that task by taking on the mind-set of a competitor's attorney endeavoring to further *his* client's interests.

### Mine the Embodiments

We have seen the dangers of beginning from the embodiment when analyzing an invention. A careful study of the embodiments can, however,

help uncover the breadth of the invention in the context of a problem-solution analysis. The prescriptions presented in this section help us to do so.

### **Investigate What's Really Going On?**

One way of gaining insight into the breadth of the invention is to ask, *What's Really Going On?* or—more completely—*What's Really Going On to Solve the Problem?* The word “really” emphasizes a search for the fundamental problem and the fundamental solution. What is going on *really*?

The answer to *What's Really Going On?* can usually be expressed in functional terms, so we should think more functionally than structurally, in verbs rather than nouns, in method steps rather than structural elements.

The exhortation to discover *What's Really Going On?* invites us to exercise our technological curiosity; to dig down and discover what the invention is accomplishing at its essence; to understand what is going on at the 50,000-foot level; to see the invention in terms of fundamental causes and ultimate effects, without all the stuff in between.

Answering *What's Really Going On?* means, then, figuring out what solves the problem in at least a rudimentary way—not what solves the problem in the most elegant, efficient, or commercially attractive way. It means discovering which aspects of the embodiment(s) are essential to solving the problem *at all*. Competitors rarely implement an invention exactly as the inventor did. Indeed, competitors may sacrifice a measure of elegance, efficiency, or even commercial attractiveness in their products if it means being able to get into the market or avoid paying a patent royalty. Or they may devise their *own* elegant, efficient, or commercially attractive implementations. The more limitations in a problem-solution statement (and ultimately a claim that is based on it), the easier it is for a potential infringer to render himself a *non-infringer*.

If the inventor has devised two or more embodiments, we should try to identify what is common among them. If they are different embodiments of what is truly the same invention, *What's Really Going On?* will be the same in each of them. If the inventor has devised only one embodiment, we can encourage her to think of others—even some “far-fetched” ones, as described below<sup>2</sup>—and then identify what is common among all of them.

The prescription to investigate *What's Really Going On?* can be used not only when planning out the first draft of a problem-solution statement but also to weed out undue limitations in a problem-solution statement or claim already under way. Given an aspect of the embodiment(s)—a physical element, a method step, a functionality, or a relationship

among these—we should ask whether it is essential to the solution or, on the other hand, only an aspect of how the inventor happened to *embody* the solution. Any element or detail not contributing to the core of the solution is probably not part of what's really going on and not an indispensable part of the broad invention. Such an element or detail may create a loophole, enabling others to use the inventor's teachings without coming within the ambit of her patent.

The inventor sometimes insists that the invention cannot be implemented without some particular implementational detail. Or she may insist that the invention is only applicable to a narrow technological environment. If the inventor is correct, defining the invention to include that detail would not be damaging. Indeed, there would be a potential benefit. The more limited the invention definition (as ultimately embodied in the patent claims), the more difficult it is for the patent examiner to find prior art that anticipates it. This can reduce legal costs and lead to a quicker issuance of the patent.

However, one can rarely guarantee that the inventor's view is correct. An inventor is often too wound up in her embodiment(s) to appreciate how her basic ideas may be implemented by others. She often fails to appreciate how her particular embodiments may be but trees in a larger inventive forest. It is often easy enough, however, for the attorney to help the inventor appreciate what's really necessary for the invention by conjuring up a few commercially plausible alternative embodiments that do not include one or more details that the inventor insisted were so indispensable.

### Separate What from How

Certain aspects of the inventor's embodiment(s) may allow the problem to be solved more completely or more advantageously than if the invention were implemented some other way. But the invention is not about preferred ways of solving the problem. It is about solving the problem, period. Separating *What from How* means figuring out *what* solves the problem, as contrasted with *how* the embodiment(s) just happen to implement the solution.

The process of separating *What from How* focuses not on what the broad invention *is*, but what it is *not*. The question is: Would the invention as currently defined solve the problem to at least some extent even in the absence of a particular element, step, or interrelationship in the embodiment? If so, that aspect of the embodiment is most likely a *how* and not a *what*, relating not to the broad invention but to the implementation. We saw in our ballpoint pen example<sup>3</sup> that its embodiment's "ink regulating means" and contracted barrel mouth were not essential to

solving the problem of writing with ink on a rough surface and, as such, were not necessary to define what the invention was.

This is not to say that the implementational details—the *hows*—are totally unimportant. Some of the embodiment's *hows* will serve as the basis for important fallback feature claims.<sup>4</sup> The *hows* of the embodiment(s) are also needed to satisfy the requirements of “enablement” and “best mode.”<sup>5</sup> Our focus at the moment, however, is distilling the invention down to its bare essence.

The process of separating *What from How* helps address one of the patent practitioner's more insidious demons—the almost irresistible mental hold that certain embodiment details can exert over us. Even the most experienced attorney can be seduced into thinking that some aspect of the embodiment(s) is necessary to the invention, when it is not. Separating *What from How* helps guide our thought processes away from the embodiment and the lure of its implementational details toward a broader view of the invention.

A caveat: Used in isolation, separating *What from How* may broaden out the embodiment but completely miss the invention, as we saw in the case of the Konaclip.<sup>6</sup> This technique should not be used, then, when formulating a problem-solution statement or a claim in the first instance. It should be used, rather, only after a problem-solution-based analysis is already under way or when we are intentionally setting out to draft a claim of less than fully broad scope.<sup>7</sup>

Our view of the *what* vs. *how* status of an embodiment detail may change once the problem-solution statement is compared to the prior art. For example, a feature of the Wright brothers' 1903 flying machine was a wing-warping mechanism, as shown by the dashed lines in Figure 4-2. Wing warping provided lateral control during flight, allowing the pilot to

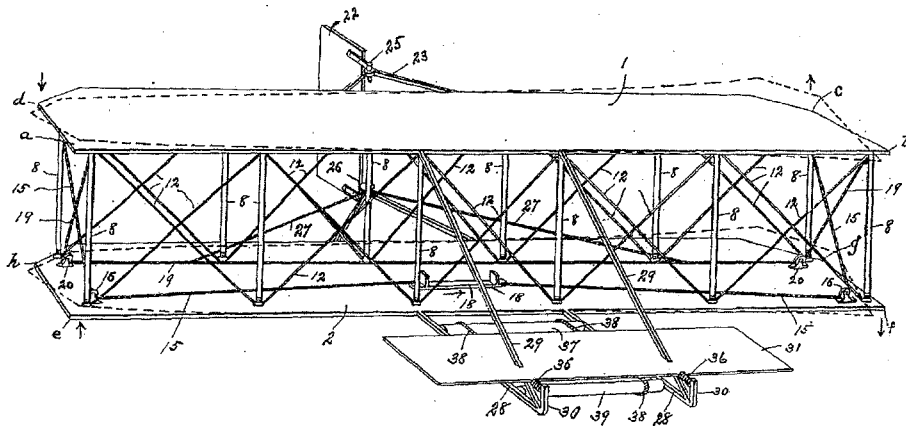


FIGURE 4-2 The Wright brothers' “aeroplane,” patented in 1906.

keep the wings level. Providing lateral control would certainly seem to be an implementational detail—a *how* not essential to a definition of a machine capable of heavier-than-air flight. One might therefore think to characterize the Wrights' invention as comprising nothing more or less than a lift-producing wing and a source of motive energy, as in the following problem-solution statement:

*The problem of achieving heavier-than-air flight is solved by the combination of (a) a wing structure that provides lift when moved relative to the atmosphere and (b) a source of motive power to provide said relative motion.*

This problem-solution statement is too broad, however. At least one flying machine having a lift-producing wing and a source of motive power was built prior to the Wrights by one Clement Ader some thirteen years before Kitty Hawk. Ader's craft was impractical; it had no lateral control mechanism and, as a result, was incapable of sustained flight beyond perhaps 150 feet.<sup>8</sup> Even so, the above problem-solution statement characterizes not only the Wrights' 1903 flying machine, but Ader's as well. It also reads on flying dinosaurs and most species of birds.

We see, therefore, that changing the wing configuration to achieve lateral control was not an aspect of *how* the Wright brothers implemented their invention. It *was* the invention and, indeed, is recited in even the broadest claims of their 1906 patent.<sup>9</sup>

### **Dream Up Alternatives, Including Some Far-Fetched Ones**

A powerful tool for finding loopholes in an invention definition is to dream up some alternatives to the inventor's embodiment(s), including some alternatives that are far-fetched. These are embodiments that, while outlandish or "wacky," would nonetheless solve the problem to at least some extent. The more far-fetched the better. The point is not to claim, or even to disclose, these embodiments in the patent application. The point is that even a far-fetched embodiment can solve the problem without involving some of the implementational details required by practical embodiments. Dreaming up far-fetched embodiments is thus another way of isolating the essence of the invention from its implementational details and thereby identifying limitations in the problem-solution statement, or in a claim, that aren't needed after all.

For example, the push-button telephone introduced in the 1960s replaced the electrical pulses generated by a rotary dial with tones generated by electronic oscillators. Oscillators were the only way known at the time to generate tones electronically and a physical switch (e.g., push-button) was the only way known for a user to indicate the digit she

wanted to dial. Here is a possible problem-solution statement for this invention:

*The problem of slow dialing of rotary telephone instruments is solved by using oscillators to generate tones in response to user operation of push-buttons.*

A far-fetched embodiment of a push-button telephone, however, might use trained miniature parrots to whistle the tones in response to verbal commands. Such an embodiment would not use oscillators or push-buttons. Yet it implements the same concept that underlies the "real" embodiment: signaling into the telephone network from the telephone customer's premises using tones rather than pulses. Thinking about whistling parrots and voice commands should lead us to a problem-solution statement devoid of oscillators or push-buttons:

*The problem of slow dialing of rotary telephone instruments is solved by a telephone dialer that generates for each of a plurality of unique dialing indications a respective unique signal comprising at least one tone.*

This second problem-solution statement covers not only the original oscillator-plus-push-button embodiment but also the parrots-plus-spoken-command embodiment. The latter embodiment is not of practical interest, of course. Importantly, however, conjuring up that far-fetched embodiment led us to a problem-solution statement encompassing realistic embodiments that were probably unimagined, if not unimaginable, when the push-button telephone was conceived of. For example, there are now ways of generating tones without oscillators and ways of dialing a telephone number without the use of push-buttons, for example, by voice command or point-and-click dialing from a computer screen. Thus a patent claim based on the second problem-solution statement would potentially have had longer staying power, and would have covered more real-life, realistic embodiments, than a patent based on the first one. In this particular case, the patent would have expired long before non-oscillator-based tone generation came to market in any widespread way. In general, however, one never knows how quickly today's implementational imperative will become the old way of doing things. Dreaming up far-fetched embodiments helps us deal with that eventuality.

It may be unreasonable to expect an inventor or her attorney to divine the technological advances of the future. But it is not unreasonable to expect them to anticipate that advances of some kind will inevitably occur. Dreaming up various embodiments of the invention, including

some far-fetched ones, helps us identify those aspects of the current problem-solution statement that are inherent in the underlying inventive concept from those that are merely illustrative details.

### Broaden Out the Problem

When a problem-solution statement is too narrow, the offending language is usually in the solution portion. However, it is also possible for the problem to be stated too narrowly which, just as in the case of the too-narrow solution, can lead to an unduly narrow claim.

One way the problem gets stated too narrowly is by being framed in view of the inventor's own work. As we saw in our discussion of the coffee-maker of Figure 3-1, this can result in at least some of the inventor's contribution being relegated to prior art status. This in turn, can result in a too-narrow problem-solution statement and, ultimately, a too-narrow claim.

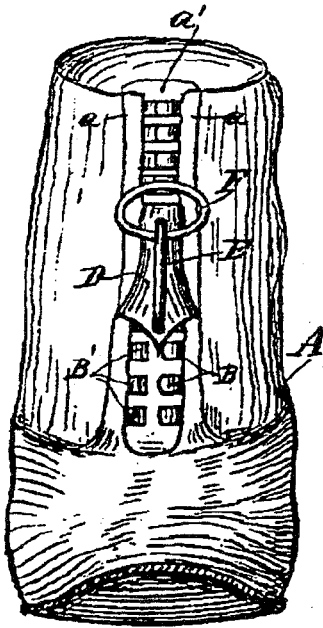
As another example, suppose the inventor of the Konaclip<sup>10</sup> had made a big point of the fact that the Konaclip would not hold paper very securely if its central leg were straight, as shown in Figure 4-3, rather than serpentine, as seen in Figure 2-1. From this perspective one might conclude that the straightness of the central leg is the problem, and the serpentine shape is the solution. That might be a correct analysis if the straight-legged Konaclip had been in the prior art. But since *no* Konaclip-like paper clip previously existed, the analysis is too narrowly focused, leading to an invention definition that includes the serpentine central leg. The problem that the Konaclip inventor set out to solve was not the ineffectiveness of a Konaclip straight leg as compared to the serpentine leg. He *invented* the Konaclip, after all. Rather, the problem that the Konaclip inventor set out to solve was the more general problem of secure and convenient holding of a stack of paper without damaging it. That, then, is the appropriate problem statement for the Konaclip.



**FIGURE 4-3**  
Konaclip with  
straight  
central leg.

Another way the problem gets too narrowly stated is when the environment or context for the invention has not been fully explored and ultimately gets characterized too narrowly.

For example, what problem did the zipper solve? Knowing all the ways in which zippers have come to be used—clothing, zippered ring binders, backpacks—it would be apparent to us today that the generic problem solved by the zipper is how to quickly and easily join and later separate the margins of two pieces of flexible material. But, the original



**FIGURE 4-4** The problem that Judson's "clasp locker" (later, the "zipper") was originally intended to solve was the inconvenience of shoe buttons.

use envisioned for the zipper was very specific. Its inventor, Whitcomb Judson, developed his invention as a replacement for shoe buttons, which were tiny and required the use of a buttonhook—a tedious and time-consuming process. Judson's "clasp locker," shown in Figure 4-4, promised to be a boon to shoe-wearers the world over. As a result, the inventor might well have become so fixated on shoes as to overlook the possibility that the problem solved could go far beyond the problem of shoe closure. Judson and his patent attorney might therefore have developed a problem-solution statement such as the following (where the shoe-related terminology is underscored) and called it a day:

*The problem(s) attendant to fastening a shoe using shoe buttons are solved by (a) a row of clasps made with interlocking parts disposed on opposing flaps of the shoe which when in position, can only engage each other when at an angle to the line of strain, and (b) a movable guide having two guideways which are separated at one end and converge into a single guideway at the other end.*

Happily, they were smarter than that. Although Judson and his patent attorney James Williamson could have been blinded by a shoe-centric view of the invention, at least one of them understood that the problem solved was not limited to shoe closure. As related in Judson's 1893 patent,<sup>11</sup>

The invention was especially designed, for use as a shoe-fastener; but is capable of general application wherever clasps consisting of interlocking parts may be applied, as for example, to mail-bags, belts, and the closing of seams uniting flexible bodies.

Indeed, most of the claims of the patent embody this realization, as evidenced by their preambles.

4.1 A device for engaging and disengaging a series of two-part clasps upon a shoe or other article, consisting of . . .



4.2 A hand device for locking or unlocking a series of two-part clasps or similar interlocking parts, which engage or disengage by an angular movement, the said device consisting of . . .

A great many other pioneering inventions proved to have much wider applicability than the specific application originally envisioned by their inventors. These include the atmospheric steam engine (originally developed to pump water out of coal mines); bar coding (railroad freight cars); and the vacuum tube amplifier (radio broadcasting). It is not important for our discussion here whether the patents for those inventions claimed them broadly beyond the inventors' originally envisioned application, or whether technology or the marketplace would have been ready for other applications before their patents might have expired. We never know how soon the world may find uses for an invention beyond those originally contemplated by the inventor. Thus in trying the problem-solution statement on for size, it is important to think beyond the initial problem environment to see if the problem statement is narrower than it needs to be.

Many of the tools and paradigms helpful in broadening the solution part of the problem-solution statement can also be helpful in broadening the problem. For example,

- Ask *What Problem Is Really Being Solved?* The answer for the zipper, for example, is the problem of being able to join flexible bodies, not just shoe flaps.
- Dream up alternative, possibly even far-fetched, environments as a way of seeing the problem in a more generic context.
- See if the problem can be stated more generally by pruning and distilling it down from its current formulation.

### **Prune and Distill**

Pruning and distilling are among the more mechanical techniques available to broaden a problem-solution statement or a claim. They might even be thought of as a kind of word processing.

Pruning means completely eliminating limitations not needed to distinguish the invention from the prior art. Each element, each function, each adjective needs to be examined to see if it is really necessary.

Distilling is a related technique. Rather than totally pruning away a limitation, it may be possible to make it more general. Or it may be possible to combine two or more recited functions or elements into a single, more generic or overarching function or element. For example, we might replace "bolt" with the more general term "fastener" or combine the individual steps of "point" and "click" with the single step "select."

Not only should whole elements come under scrutiny, but individual words as well. Adjectives should get particular attention. Sometimes a judicious adjective or two may be the most effective way of distinguishing the invention from the prior art. However, adjectives mostly narrow an invention definition without enhancing its differentiation from the prior art. Adjectives are usually just surplusage that we can safely prune away and thereby broaden the problem-solution statement. Examples we will encounter later in the book include *automobile* floor mat and *block* copolymer.<sup>12</sup>

Pruning and distilling were presented in a negative light when introduced in Chapter Two.<sup>13</sup> In that context, however, the starting point was a claim intentionally directed to the embodiment. Language going to the heart of the invention was not guaranteed to be present at the outset. Even if such language were present at the outset, we had no principled way of preventing it from being inadvertently lost during the pruning/distilling process.

The reason it is safe to prune and distill at *this* point is that the words being worked over do not constitute a description of the embodiment, but a definition of the invention in problem-solution terms.

### Consult with Colleagues

There are as many approaches to analyzing inventions as there are attorneys plying this trade. The analysis of virtually any invention can therefore invariably be enhanced by discussing it with a colleague. It is rare that another patent attorney will not have some probing question or insight that can shed further light on the problem and/or the solution.

This section presents some invention identification ideas that a number of practicing patent attorneys have shared with the author. Not surprisingly, the author's and the other attorneys' approaches coalesce into a few thematic strains. We are, after all, all focused on the same goal—determining *What Is the Invention?*

#### First “See” the Invention

One colleague refers to his starting-point process as “seeing” the invention. The paradigm is a powerful one. The notion of seeing the invention implies a mind's-eye grasp of an answer to the question, *What's Really Going On?*<sup>14</sup>

Before beginning the claim drafting process, one must first “see” the invention, and not just an embodiment of the invention, although sometimes it is not easy to distinguish between the two. Nonetheless I believe that the key to understanding the

invention is to gain a fundamental understanding of the concept(s) *behind* the embodiment(s). By understanding the principle behind the result, the claim drafter should be able to draw a broader claim than otherwise.

I usually get there by continuing to ask questions of the inventor, each time stripping away verbally the extra stuff so that I can change the example that had been presented and still have the inventor say, “Yes, that is what I mean.” Or, “Yes, that will work also!”

I was trained to always write a problem-solution and a claim. Now I boil the invention down by simply writing a claim that reflects my thought process. But I think that in the back of my mind I have worked through the problem and solution while forming the claim in my mind.

—DHT

### Use the European (“Jepson”) Claim Format as an Invention-Analysis Model

Another attorney recommends thinking about the invention in terms of the European, or Jepson-type, claim format at the invention-analysis stage, whether or not one ultimately wants to have claims of that type in the patent application. Readers may well already be familiar with this format, in which the so-called inventive departure is set off from the rest of the claim by a transitional phrase such as “the improvement comprising” or “characterized in that.”

Here, for example, is a European-style claim directed to the idea of keeping the food moving within a microwave oven to solve the problem of nonuniform heating:

A microwave oven comprising  
an oven cavity, and  
a microwave energy source for heating food within the cavity,  
THE IMPROVEMENT COMPRISING  
means for engendering relative motion during the heating process  
between the food and the microwave energy source.

Such point-of-novelty claiming might not be where you want to end up. However,

it may be a place that you want to start your thinking process from. It helps one conceptualize what was done before, and

what was added or changed by the inventor to solve the problem or yield the improvement. If the improvement is simply stated (just one element), you have a good start on a broad claim. Then, you look at the preamble—the words leading up to “the improvement comprising”—and see if the same improvement works in other environments.

—BHF

This approach serves as the basis of a claim-drafting technique called “inventive-departure-based claiming,” presented in Chapter Eight.

### **Envision the Marketplace**

Another attorney focuses on the ultimate marketing of the invention, thereby engaging the inventor on his own terms.

I ask the inventor to envision the marketplace. What would he tout about his invention if he had to actually sell it? Is it, for example, faster than the known alternatives? Lighter? Less expensive? More efficacious? Once he has told me, I ask him to point to what exactly it is in his system or process that makes those advantages possible. We then proceed to sketch out the invention on a piece of paper and refine the picture to a point where it contains only the minimum necessary prior art structure to support the thing that he pointed to. A particular benefit of this approach is that it enables the inventor to supply what the attorney needs within an analytical framework that is natural and routine to the inventor rather than my having to turn the inventor into a junior patent attorney in the first instance.

—GCR

### **Imagine You Have Only 60 Seconds to Describe the Invention**

A colleague suggests that distilling the invention down to its essence can often be achieved by asking the question, “What would you say if you had to say it in 60 seconds?”

When I supervised attorneys in a corporate setting, I recommended as follows: “Envision yourself having to explain the invention to a manager who holds the patent filing purse strings. The manager is in a hurry to attend a meeting. Imagine that you have only 60 seconds to describe the invention’s nov-

elty while accompanying him to the meeting room door. What would you say in one or two sentences?"

I also strongly urged that any such one- or two-sentence description of the invention should focus on the inventive solution and its benefit. Knowing what the benefit is helps you identify those few things that are necessary to provide that benefit and thus those few things that should be contained in the broadest claim.

—HTB

In a similar vein, another attorney observes that unless one can give a short-and-sweet answer to *What Is the Invention?* more analysis is required.

One needs to be able to answer the question "What is the Invention?" without a lot of arm-waving and a half-hour diatribe. Otherwise, you have not grasped the essence of the invention. Once I can answer "What is the Invention?" I can then draw a boundary around those elements or functions—mechanical, electrical, or whatever—that allow the invention to overcome the problems unsolved by the prior art. I then try to distill the encircled elements into a single function by aggregating a number of more specific functions into a broader generic one.

—DRP

### Cross-Examine the Inventor

In yet another approach, a colleague writes the patent application's Background and Summary early on in the process—preferably in collaborative engagement with the inventor. This gives him an opportunity to explore the problem and solution in narrative form. The inventor is cross-examined as the words evolve. (This is a favored approach of the author as well and is described later in the book.<sup>15</sup>)

Whenever possible, I write the patent application with the inventor sitting next to me, and I analyze the invention using a method that I call "cross-examine the inventor." As I initially write the background and summary based on what he tells me he thinks is the invention, I keep asking him if each thing I have written is essential. I try to think of cases where a particular thing might not be necessary, as if I were attacking the summary in court, and urge the inventor to do the same. When I'm done, I

put it into claim form. Then I explain to the inventor what the claim is about, what the elements are, and that they all must be present for infringement. Then I go over each one again and see if any particular element seems optional. Then I go back to the summary if there are any changes. Of course, as I write the detailed description and begin to really understand what is going on and the inventor opens up more and explains more, thereby peeling back some of the layers he has unintentionally (or maybe even intentionally) hidden from me, I further refine the summary and claims in an iterative manner.

—EJR



Discovering the breadth of the invention is only half the story. We must also be able to evaluate a problem-solution statement or a claim to determine if it is so broad as to read on prior art and to fix it if it *is* too broad. That aspect of the practice is addressed next.

### Notes

1. See Chapter Seven, pp. 69–77.
2. See p. 35.
3. See pp. 6–9.
4. See Chapter Six, pp. 53–64.
5. 35 U.S.C. 112, ¶ 1.
6. See pp. 12–16.
7. See Chapter Nine, pp. 103–114.
8. TOM D. CROUCH, *A DREAM OF WINGS: AMERICANS AND THE AIRPLANE, 1875–1905* (Washington, D.C.: Smithsonian Institution Press, 1989).
9. U.S. Patent No. 821,393 (issued May 22, 1906). Claim 1 of the Wrights' patent recites "In a flying-machine, a normally flat aeroplane [wing] having lateral marginal portions capable of movement to different positions above or below [sic] the normal plane of the body of the aeroplane, . . ."
10. See pp. 12–16.
11. U.S. Patent No. 504,038 (issued Aug. 29, 1893). Judson's embodiment didn't work well. An improved version, much more akin to the zippers we know today, was invented by Gideon Sundback, for which he was granted U.S. Patent No. 1,219,281 (issued March 13, 1917).
12. See p. 88.
13. See p. 12.
14. See p. 32.
15. See pp. 246–248.

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## CHAPTER FIVE

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# The Problem-Solution Statement— Reining in Overbreadth

Just as a problem-solution statement can be too narrow, it can also be too broad. A pending claim based on an overly broad problem-solution statement will be rejected as unpatentable. An overly broad issued claim will be declared invalid.

Thus evaluating a problem-solution statement—trying it on for size—means not only determining whether it is too narrow but also whether it is too broad. Techniques for assuring ourselves that the problem-solution statement is as broad as it can be were presented in Chapter Four. This chapter presents ways of evaluating a problem-solution statement or a claim to make sure it is not *too* broad.

### **Read the Problem-Solution Statement as Broadly as Possible**

A crucial skill for patent attorneys is the ability to appreciate what the words in a patent claim could be interpreted to mean—as compared with what we *intend* them to mean. The methodology described in these pages has us formulating a problem-solution statement rather than claims in the first instance. However, at least some of the patent application's claims will be based on the problem-solution statement, as we will see in upcoming chapters. Thus it is appropriate to evaluate the language of the problem-solution statement with possible overbreadth in mind.

An attorney trying on the problem-solution statement for size must not view his words through the lens of his own disclosure. The words of the problem-solution statement must be compared to the prior art as an examiner will do with the claims to see if there is some way—*any* way—that the words of the problem-solution statement can be made to read on prior art, whether relevant to the inventive contribution or not.

For example, an attorney writing a problem-solution statement for the first “horseless carriage” and following the prescription to *Think Big*<sup>1</sup> might have thought the invention to be the idea of mounting an engine on a wheeled chassis and using its energy to rotate the wheels:

*The problem of moving people or things without the need of human or animal power is solved by mounting an engine on a wheeled chassis and using energy generated by the engine to rotate the wheels.*

However, the railroad locomotive, which long preceded the automobile, also meets this definition. So does the paddlewheel steamboat. It would be of no matter that the attorney intended the term “wheeled chassis” to mean something narrower.

Indeed, cases are legion in which a patent applicant insisted that his claim language meant something specific, but the patent examiner, and ultimately the court, decided that it meant something broader. The patent applicants in one such case<sup>2</sup> argued that the claim limitation that A and B are “integrally formed” with one another meant that A and B must be fused into one piece, such as by being cast as a molded article or welded together. They needed that argument accepted to avoid prior art in which A and B were separate pieces that were bolted together. The Federal Circuit held, however, that the term “integrally formed” could, indeed, encompass such prior art two-piece structures and affirmed the examiner’s finding of unpatentability. To similar effect was a case that broadly interpreted the terms “window” and “data” used in defining a computer interface.<sup>3</sup>

The message of such cases is that the meaning that will be ascribed to claim language is not necessarily as narrow as the patent applicant intended or—faced with new prior art—as narrow as the patent applicant may later want to argue. Rather, the meaning that will be ascribed to claim language can be virtually anything that is lexically reasonable. Indeed, examiners are duty-bound to give the words in a claim their plain meaning and to read the claims on prior art as broadly as the claim terms reasonably allow, even if that prior art has little or nothing to do with the subject matter invented and does not disclose the inventive concept.<sup>4</sup> This protects the public against patent owners who might attempt to enforce their claims against prior art subject matter once the patent is issued.

There is one exception: A claim term can be explicitly defined in the specification. That definition will then be used when interpreting the claim. It is said in this regard that a patent applicant is allowed to be his own lexicographer.<sup>5</sup> In the horseless carriage example, the term “wheeled chassis” could be explicitly defined in the specification to mean a vehicle that can travel over roads or open ground, thereby excluding from the definition locomotives and paddlewheel boats.



As used in this specification and the appended claims, the term “wheeled chassis” means a vehicle that can travel over roads or open ground.

However, absent an explicit definition in the specification, claim terminology means anything and everything that it reasonably *could* mean, not just what the applicant intends or argues it to mean.

The language of a problem-solution statement or a claim thus needs to be evaluated, and possibly narrowed, with the above ideas in mind.

### Narrowing the Right Way

It is easy enough to narrow an overly broad invention definition in *some* way. Just find some aspect of the inventor’s embodiment(s) not shown in, nor obvious in view of, the prior art and add it to the problem-solution statement or claim being drafted.

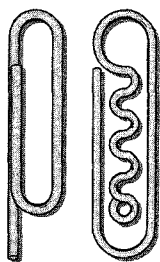
That approach, however, is a recipe for disaster, as it may well result in a view of the invention that is much too narrow. As discussed in the following sections, we must continue to search for a broad and functional characterization of the solution to the problem that the invention solves. Moreover, we need to consider whether it is not the *solution* that is stated too broadly, but the *problem*, that is, the solution’s context.

### Continue to Focus on Breadth and Functionality

In deciding how best to narrow an overly broad problem-solution statement or claim, we need to stay focused on the principles presented above. For example, we need to ascertain what’s really going on to solve the problem that is *not* going on in the prior art that makes the problem-solution statement too broad. It is all too easy—especially if we are mentally fatigued after having pounded away at the invention for a while—to fall back on just any old embodiment detail as a way of fixing the problem-solution statement. That urge must be resisted, however, lest we arrive at a view of the invention that is unduly narrow.

Let us revisit Chapter Two’s Konaclip example.<sup>6</sup> An initial problem-solution statement for the Konaclip might have been directed to a clip that slides onto both sides of the paper and uses spring action to hold the paper in place.

*The problem of holding a stack of paper together securely without damaging the paper while being convenient to take on and off is solved by a bent-wire clip that includes at least two sections slidable onto*



**FIGURE 5-1** The Perfection and the Konaclip.

respective sides of the stack of paper, each section being urged into the plane of the paper by spring action.

This statement of the Konaclip invention is too broad, however. It describes not only the Konaclip but also the prior art Perfection clip,<sup>7</sup> which also slides onto both sides of the paper and uses spring action to hold the paper in place. Figure 5-1 illustrates both clips.

Upon comparing the Konaclip and the Perfection, it would be tempting to narrow this problem-solution statement by adding words directed to the Konaclip's central leg. Indeed, that unique feature of the Konaclip clearly differentiates it from all the paper clips that came before it. Such a definition of the Konaclip, however, would not capture the Gem, which—in our example at least—came later and, as we know, became the marketplace winner. Indeed, our previous analysis concluded that what is really going on in the Konaclip is its notion of equal pressure against opposing rails. Like the central leg, the equal-pressure aspect of the Konaclip distinguishes it from the Perfection. Unlike the central leg, however, the equal-pressure aspect of the Konaclip carried over into the Gem and, like the Gem, addressed the problem of holding a stack of paper securely, conveniently, and without damage. As we know, the Konaclip quickly dropped out of the marketplace; but its underlying concept, as embodied in the Gem, has survived to this very day.

### Consider Narrowing the Problem Rather than the Solution

Inherent in the problem-solution statement formula

*The problem(s) of \_\_\_\_\_ is(are) solved by \_\_\_\_\_.*

is the idea that an invention comprises not only a solution but the problem that is solved. As such, the problem-solution statement incorporates an environment or context for the invention. If a problem-solution statement is too broad, then, the best way to narrow it may not be to narrow the statement of the solution, but the statement of the problem. Even if the solution portion of the problem-solution statement reads on the prior art, the problem-solution statement as a whole may not be overly broad if (a) the solution appears in the prior art in a different environment or context, and (b) it would not have been obvious to use the stated solution in that environment or context.

For example, some time after the microwave oven was invented, it was recognized that the food is heated more uniformly if it is moved around within the oven. The cause of uneven heating is that standing waves within the oven create regions where the energy is more intense. Moving the food around within the oven means that more parts of the food will receive their “share” of that more intense energy.<sup>8</sup>

An attorney answering the question *What’s Really Going On?* and “thinking big” would recognize that the turntable is only an implementational feature, and that the broad invention is simply to engender relative motion between the food and the source of cooking energy. Here is the problem-solution statement:

*The problem of nonuniform heating of food is solved by engendering relative motion between the food and the energy source during the heating process.*

This problem-solution statement is too broad, however. For example, it reads on the prior art rotisserie oven. It even reads on the prior art process of stirring the contents of a saucepan heating on a stove.

The problem-solution statement could be narrowed into the realm of patentability by narrowing the solution to recite the turntable (assuming that no food-cooking prior art shows a turntable). But our problem-solution analysis has already told us that what’s really going on to solve the problem is not the use of a turntable but the relative motion of the food, however that might be accomplished. This is confirmed by the fact that we can dream up a far-fetched embodiment that also solves the problem,<sup>9</sup> such as recruiting a band of little microwave-impervious people to march the food around inside the oven.

The fix lies in amending the *problem*. The problem-solution statement can be narrowed into the realm of patentability by explicitly putting the invention into the microwave oven context.

*The problem of nonuniform heating of food in a microwave oven is solved by engendering relative motion between the food and the microwave energy source during the heating process.*

The prior art’s teaching of “engendering relative motion between the food and the energy source” in more conventional food preparation contexts would not have rendered it obvious to perform that step in a microwave oven, given that microwaves permeate the oven enclosure and it wouldn’t have been thought in the first instance that there would be a nonuniform heating problem.

Upon reviewing this second problem-solution statement, however, we find that it is still too broad. Early microwave food-heating apparatus moved the food across the end of a waveguide out of which the microwaves emanated, thereby anticipating the “engendering relative motion” limitation.<sup>10</sup> The way out of this fix is, again, to focus on the problem and the context in which it arises. The prior art waveguide-based microwave heating apparatus did not suffer from the standing wave phenomenon, and therefore the nonuniform heating problem did not arise. Standing waves occur when the microwaves are confined within a so-called microwave cavity. The enclosed main chamber of the modern microwave oven is such a cavity. Putting the invention into that context by including the word “cavity” in the *problem* portion of the problem-solution statement distinguishes the invention from the prior art without resorting to a “turntable” limitation in the *solution* portion:

*The problem of nonuniform heating of food in a microwave oven cavity is solved by engendering relative motion between the food and the microwave energy source during the heating process.*

Another approach could be to put the invention into the context of a microwave oven in which the distribution of microwave energy is not uniform, leading to a problem-solution statement such as the following:

*The problem of nonuniform heating of food in a microwave oven in which the distribution of microwave energy is substantially nonuniform is solved by moving the food within the oven in such a way that different portions of the food pass through regions of both relatively low and relatively high microwave energy.*



The principles presented thus far enable us to define the invention as broadly as we believe we are allowed to based on the prior art. That is, the prior art we are *aware* of. Other prior art can appear at any time after the patent application is filed, potentially invalidating any claim based on what may prove to be an overly broad problem-solution statement. Anticipating *that* possibility is the subject of the next chapter.

## Notes

1. See p. 21.
2. *In re Morris*, 127 F.3d 1048, 44 USPQ2d 1023 (Fed. Cir. 1997).
3. *Apple Computer Inc. v. Articulate Systems Inc.*, 234 F.3d 14, 57 USPQ2d 1057 (Fed. Cir. 2000).

4. See, e.g., *In re Morris*, *supra*, and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970). But see *In re Donaldson Co.*, 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994) (en banc), (specification sets a limit on how broadly the Patent and Trademark Office may construe means-plus-function language under the rubric of reasonable interpretation).

5. See, e.g., *In re Hill*, 161 F.2d 367, 73 USPQ 482 (CCPA 1947), *Multiform Desiccants Inc. v. Medzam, Ltd.*, 133 F.3d 1473, 45 USPQ2d 1429 (Fed. Cir. 1998).

6. See pp. 12–16.

7. See p. 13.

8. U.S. Patent No. 2,632,838 (issued March 24, 1953).

9. See p. 35.

10. U.S. Patent No. 2,495,429 (issued Jan. 24, 1950).



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## CHAPTER SIX

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# Fallback Features and the Planned Retreat

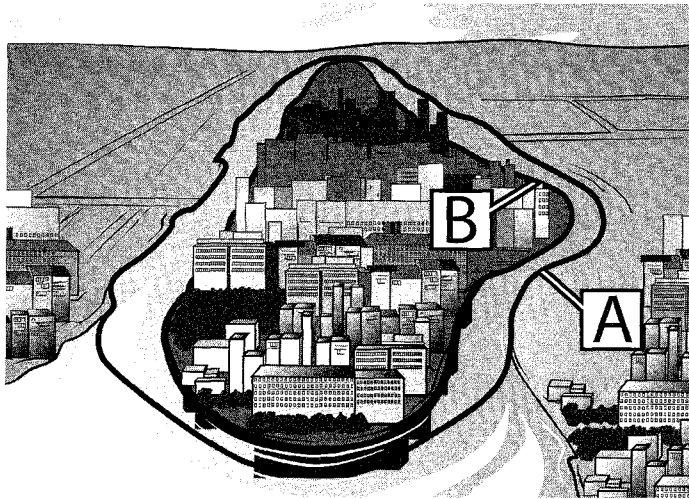
Prior art that comes to light after a patent application has been filed may render its broadest claims unpatentable or invalid. This chapter presents an invention analysis strategy—called the Planned Retreat—to take account of that possibility. At the heart of the strategy is the use of the problem-solution paradigm to identify the invention’s “fallback features,” which ultimately translate into intermediate- and narrow-scope claims for the patent application.

### **The Need for a Fallback (Retreat) Strategy**

A patent application must include at least one claim.<sup>1</sup> Limiting ourselves to that one claim is not a good idea, however. We can never be sure that all the relevant prior art has been found and that the problem-solution statement—and any claim on which it is based—is not overly broad. There’s a lot of prior art out there, including over 7 million patents issued in the United States and tens of millions more issued in countries around the world, not to mention all the journal articles and technical books ever written.

A patent application therefore needs claims of varying scope. This means not only claims that define the invention at what we believe to be its broadest but also other claims, either in independent or dependent form, that stake out more modest parcels of intellectual property by qualifying the broad invention definition.

We hope that the patent application’s broadest claims will survive patent examination, as well as any subsequent attack on patentability mounted by the Opposing Team. If the broadest claims do survive, the presence of narrower claims in the issued patent is of little moment; a patent is infringed even if only one of its claims is infringed. On the other hand, we never know what prior art may surface after the application is filed that will force a retreat from the invention boundaries initially



**FIGURE 6-1** If the parcel of intellectual property initially staked out is too broad (A), a well-thought-out Planned Retreat enables us to give up as little valuable intellectual property as possible while establishing a defensible position for what's left (B).

staked out. Nor can we predict the necessary extent of such a retreat. Without a range of broad, intermediate-scope, and narrow claims in the issued patent to fall back on, the patent owner might be left with no enforceable patent rights whatever.

These are among the important reasons that a patent application should be filed with a suite of intermediate- and narrow-scope claims at the outset. Indeed, depending on (a) whether the patent is pending or issued and (b) what was or was not disclosed in the patent application, it may be expensive or even impossible to secure the claims that best define the invention in view of newly discovered prior art.

### The Planned Retreat

The Planned Retreat is a strategy for formulating an array of successively restricted fallback positions, each defined by a respective claim, to which we can retreat if newly identified prior art forces us to do so. Which fallback position we retreat to depends, of course, on what the prior art does or doesn't show.

The underlying philosophy of the Planned Retreat is that there is no point in surrendering an acre if, with a little thought and planning, a patentability issue can be resolved by giving up a square foot or two. That philosophy is implemented by selecting our successive stages of

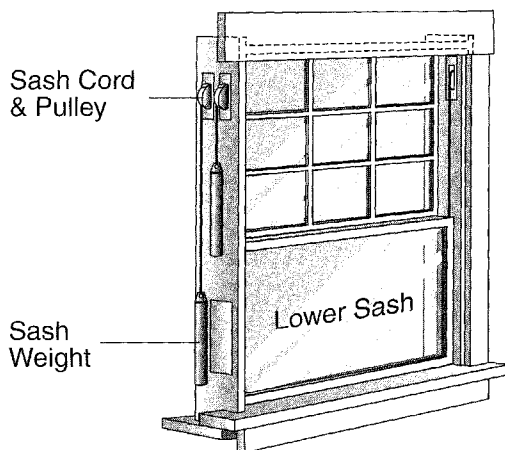


possible retreat—that is, each successively narrower claim—so as to fulfill two criteria. Those criteria are that each successively narrower claim should (a) give up as little valuable intellectual property as possible, and (b) establish a defensible position for what's left.

To “give up as little valuable intellectual property as possible” means preserving coverage for those features of the embodiment(s) that we think are more likely than others to appear in competitors’ marketplace offerings. Such a feature for the broad idea of the double-hung window, for example, would be a means that counterbalances the weight of the lower sash by pulling up on it, such as sash weights or springs. We could envision that such a means would be an indispensable feature of any commercially viable double-hung window, being more convenient than using a stick to prop up the sash or, perhaps, a tight friction fit. See Figure 6-2.

To “establish a defensible position for what's left” means that the narrower invention definition we may have to retreat *to* should have some additional likelihood of being patentable over the position we are retreating *from*. It does little good to establish a position of retreat—no matter how likely it is that the market will demand it—if the invention is no more patentable with that feature than without it.

Suppose, for example, that the broad invention is a new type of pen that turns out to be disclosed in a prior art patent that says nothing about the color of the ink. A position of retreat limiting the invention to pens of that type in which the ink is black would meet the Planned Retreat’s first criterion of giving up as little valuable intellectual property as possible, given that black is probably the most popular ink-pen color. But “black ink” is not a defensible position of retreat. Even though the prior art patent says nothing about ink color, it is obvious that the ink in *any* pen



**FIGURE 6-2** A sash weight or other mechanism to counteract the weight of a double-hung window’s lower sash would be a valuable position of retreat in view of prior art disclosing only the window.

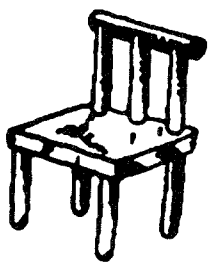
can be black. If the broad pen claim falls, the narrower pen-plus-black-ink claim will fall right along with it.

The workstuff of the Planned Retreat is the invention's "fallback features"—also referred to in the profession by such terms as "inventive features," "backup positions," and "subsidiary inventions."

A fallback feature is a facet of the inventor's embodiment(s) that can serve as a basis for patentability if what we thought was the broad invention turns out to be in the prior art. Given a combination of elements comprising the broad invention, a fallback feature is a detail particularizing one or more of those elements; an additional element; or a particular relationship among the elements. For example, a fallback feature for the double-hung window is the provision of some means for pulling up on the sash, as discussed above. A fallback feature of Loud's ballpoint pen was an anti-friction bearing for the pen's spheroidal marking point.<sup>2</sup>

An invention's Planned Retreat is formulated by identifying and prioritizing the fallback features in a way that achieves the above-stated goals of giving up as little valuable intellectual property as possible at each stage of retreat while establishing a defensible position for what's left. We will see later in this chapter how the problem-solution paradigm is enlisted in this effort. And we will see in Chapter Nine how the results of the analysis translate into intermediate- and narrow-scope claims for the patent application.

Let us take as our example the invention of the chair. The inventor's embodiment is shown in Figure 6-3 and the assumed prior art is shown in Figure 6-4. Based on this prior art, let us conclude that the broad



**FIGURE 6-3** The first chair

invention is a seating device having one or more elongated support members. The inventor calls them "legs." The chair leg solves such seating-device problems as the undue weight and lack of portability that burdened the prior art seating devices, as reflected in the invention's problem-solution statement.

*The problem of providing a seating device that is lightweight and portable is solved by the seating device having one or more elongated support members.*

What, then, should our fallback positions be? What feature(s) of this embodiment of the chair give up as little valuable intellectual property as possible if retreat becomes necessary, while providing a defensible position for what's left?

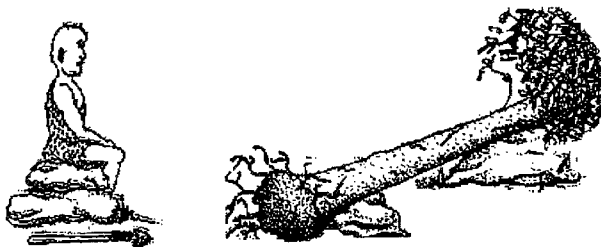
If the marketplace moves fast enough, we may have the luxury of twenty-twenty hindsight. Claims directed to features that consumers have shown they value in a chair can be added to the patent application if it is still pending in the patent office and if those features were actually disclosed in the patent application.

Usually, however, we do not have the luxury of such hindsight. And there are typically too many things one can say about an embodiment to take a scattershot approach and claim them all, let alone claim them in various combinations.

The following, for example, is only a partial list of what we might say about our inventor's chair embodiment:

- Legs are perpendicular to seat.
- Legs are exactly four in number.
- Legs are at the seat periphery.
- Legs are made of wood.
- Legs are of equal length.
- Legs are cylindrical.
- Legs have rounded bottoms.
- Legs have 3 sq. in. cross section.
- Legs are at corners of a rectangular seat.
- Legs are permanently attached to seat with an attachment means (e.g., tree resin used as an adhesive).

Note that all of these features involve the chair legs and not, for example, the seat back. Recall the admonition *Keep Separate Inventions Separate*.<sup>3</sup> The seat back is a separate invention, addressing the problem of sitter comfort rather than the problems of weight and portability solved by the use of elongated seat supports. A seating device could certainly be outfitted with a seat back even in the absence of elongated supports, and vice versa. Indeed, based on the prior art shown in Figure 6-4,



**FIGURE 6-4** Prior art to the chair

the chair back is a novel idea that could be the subject of its own patent application.

Looking then at the leg-related features listed above, it is not difficult *in hindsight* to pick out the features that give up relatively little compared to others and would well serve the goals of the Planned Retreat.

For example, a definition that limits the claimed invention to a seating device having exactly four legs still encompasses a great deal of valuable intellectual property. Moreover, based on the prior art shown in Figure 6-4, four legs is a defensible position of retreat. For similar reasons, the idea of permanently attaching the legs to the seat is another very good fallback position.

Features such as the legs being perpendicular to the seat or being at the seat periphery also surrender relatively little, given that those proved to be desirable marketplace features. But the additional patentability afforded by these features is questionable given the prior art “bench” shown in Figure 6-4.

Other features’ limitations give up a great deal and, as such, would be easy for competitors to circumvent while still having a marketable product. The leg’s 3 in<sup>2</sup> cross section is one of these. Moreover, its defensibility as a position of retreat is questionable. If chair legs turn out to be known in the prior art, their cross section would no doubt be deemed a matter of design choice and, as such, obvious.

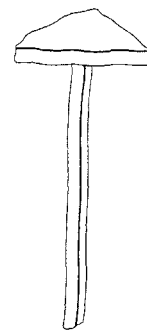
But, again, this is all in hindsight. We need to be able to determine *prospectively* which features of an invention will constitute the best fallback positions.

### Identifying the Fallback Features Using the Problem-Solution Paradigm

The problem-solution paradigm again serves us in good stead.

Recall that the reason for identifying the fallback features is that what we thought was the broad invention may actually turn out to be in the prior art. All we need do, then, is assume the existence of prior art that solves the same problem as the invention and solves it in the same way. We then carry out a problem-solution analysis with *that* as the assumed prior art.

In our chair case, then, we assume for purposes of analysis that the prior art already knew of at least one seating device having one or more legs—perhaps the one-legged stool shown in Figure 6-5. We then ask what problems relative to legs are solved by the embodiment and identify as our fallback features those solutions that appear



**FIGURE 6-5**  
Assumed  
chair prior  
art

to be the most defensible from a patentability standpoint. Here are the steps laid out more formally:

1. Assume the broad invention to be in the prior art;
2. Identify the significant subsidiary problem(s) the embodiment(s) solve;<sup>4</sup>
3. Characterize in broad terms the inventor's solution to each subsidiary problem;<sup>5</sup>
4. Identify as fallback features those solutions that best meet the Planned Retreat's dual criteria;
5. Apply steps 1 through 4 to each identified fallback feature to identify *its* fallback features, and do this iteratively until each significant subsidiary problem and its corresponding solution(s) have been explored.

We will see in the next section how four legs and permanent leg-seat attachment emerge as the clear winners based on such an analysis.

### Planned Retreat for the Chair

Applying the problem-solution paradigm to our chair, let's see what our chair inventor had to say about the problems that arose as she refined her prototype. To aid the reader, the problem- and solution-related terms are shown in *italics*.

Once I came up with the leg idea to make my chair lightweight and portable, my major concerns were *stability and low cost*. I never thought about having only one leg like you [patent attorney] are suggesting might be in the prior art. In fact, I assumed at the beginning that there would always be three legs because it's the minimum number required for stability.

I found out, however, that there are a lot of advantages to having *four legs*, particularly if they are *perpendicular to the seat* and located at the *seat periphery* and, even better, at the *corners of a rectangular seat*.

A four-legged device is *harder to tip over* than a three-legged device. It's even *more resistant to tipping* when the legs are attached at the periphery of the seat rather than in the middle and even more so when they are arranged in a rectangular pattern. When the legs are *perpendicular to the seat*, they can support more weight than when they are splayed out from the center of the seat unless you make the legs thicker and include horizontal connecting pieces between the legs. But doing that adds to the cost and the weight, so I really like the perpendicular aspect.

Three legs have the advantage that the device won't wobble at all because three points define a plane. But with careful cutting to make the legs as equal in length as possible, wobbling is not a major concern.

I was then thinking that if four legs are better than three, then maybe five legs are better than four. But that turned out not to be so. Five legs made the device more resistant to tipping over than with four legs, but the improvement was minimal. And five legs added to the wobbling problem, increased the chair's weight, and made it more expensive to build. So *the ideal number of legs is four*.

Another issue related to *weight* was the fact that my original prototypes were carved from stone. Even with stone legs, my chair was lightweight compared to the big rock slab that the prior art uses, but it was still very heavy. I decided on *wood* for the legs because it is lightweight but yet still strong enough to do the job.

*Structural integrity* was yet another issue, I found. As long as the chair was left in one spot, it was sufficient to have a friction fit of the legs into recesses in the seat bottom. But when the chair was moved, the legs tended to fall out. I fixed this problem by *permanently attaching the legs to the seat using tree resin as an adhesive*. This also made the chair *more portable* since it could be carried as a single unit.

The inventor also brought up the problem of sitter comfort, which was solved by her addition of a back for the sitter. As noted previously, the seat back is a separate invention, and in this discussion we will pass over it.

The inventor clearly regarded stability at low cost as a major problem. Her preferred solution is four legs perpendicular to the seat and attached to its periphery—indeed preferably attached to the corners of a rectangular seat. However, each of those features contributes to solving the stability problem *independently*. Each of them is, therefore, a potential fallback position not dependent on the others. And in combination, they are the inventor's preferred solution to achieving stability at low cost.

Another problem is undue weight of materials previously used for the seat supports. This problem is solved by using wood for the legs. And the problem of structural integrity is solved by permanently attaching the legs to the seat using an attachment means like tree resin rather than relying on a friction fit. This also helps solve the portability problem.

The above problem-solution analysis leads to the following more limited set of fallback features for the chair's Planned Retreat:

- Legs are perpendicular to seat.
- Legs are exactly four in number.
- Legs are at the seat periphery.
- Legs are made of wood.
- Legs are at corners of a rectangular seat.
- Legs are permanently attached to seat with an attachment means (e.g., tree resin used as an adhesive).

The remaining task is to mix and match these features to establish a set of fallback positions that best achieves the goals of the Planned Retreat. The resulting Planned Retreat strategy is shown below, where indentation of a feature under the broad inventive concept or under another feature indicates a position of retreat from the position above it. Experienced practitioners will appreciate how this hierarchy of features can inform a family of dependent claims for the broad invention.

#### **Planned Retreat for the Chair**

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1	Legs are elongated.
2	Legs are four in number.
3	Legs are at seat periphery.
4	Legs are at corner of rectangular seat.
5	Legs are perpendicular to seat.
6	Legs are perpendicular to seat.
7	Legs are at seat periphery.
8	Legs are at corner of rectangular seat.
9	Legs are perpendicular to seat.
10	Legs are wood.
11	Legs permanently attached with attachment means.
12	Attachment means is an adhesive.
13	Adhesive is plant (e.g., tree) resin.

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Each of the above fallback positions has something to commend it; but they are not all equally attractive, and so the less-attractive fallback positions might be eliminated if we are budget-limited.

#### *Fallback position 2*

The idea of having exactly four legs is a highly desirable position of retreat if retreat becomes necessary. Having four legs optimally addresses the tipping-over problem while keeping the weight down (as compared

to five legs, for example). Thus we expect that the market will crave four-legged chairs. Moreover, no prior art seating device has any more than two seat supports, rendering the four-support solution novel. And given the unexpected results the inventor achieved by using four legs rather than three, a strong case for nonobviousness of the four-leg solution can be made out should the prior art disclose a three-legged seating device.<sup>6</sup>

*Fallback positions 7 and 9*

Putting the legs at the seat periphery or perpendicular to the seat is also advantageous, as our inventor explained. Indeed, we have included them in our Planned Retreat as stand-alone features not dependent on the four-leg limitation. These are not as strong as Planned Retreat fallback positions because the prior art (Figure 6-4) makes them subject to being deemed obvious, and therefore less defensible, when standing alone, than the four-legs limitation.

*Fallback positions 3, 4, 5, 6, 8*

Our inventor noted the synergistic benefit of combining the above-discussed three features—*four* legs at the *seat periphery* and *perpendicular* to the seat—to counteract tipping, a benefit that is even more effectively realized when the peripherally located legs are at the corners of a rectangular seat. Fallback positions 3, 4, 5, 6, and 8 are various mix-and-match combinations of all these features. Each multiple-feature position of retreat does give up a larger parcel of intellectual property than do the single-feature fallback positions 2, 7, and 9. However, given what our inventor has told us about how they synergistically solve the tipping problem, we can still expect a fair amount of the marketplace to want chairs having two or more of these features in combination. Importantly, moreover, each added feature establishes an increasingly defensible position of retreat, as it becomes increasingly harder for the examiner to make out a case of obviousness.

*Fallback position 10*

The problems of weight and portability are solved by making the legs out of wood. This feature achieves its benefits independent of the other fallback positions. This is why our retreat scheme incorporates this feature only in combination with the broad, elongated leg notion.

*Fallback positions 11, 12, 13*

The problems of structural integrity and portability are solved by permanently attaching the legs to the seat with an attachment means rather



than relying on a friction fit. As with the use of the wood as the leg material, this feature achieves its benefits independent of the others and appears in our retreat scheme only in combination with the broad, elongated leg notion.

The further fallback feature of using an adhesive as the attachment means might establish a defensible position of retreat if prior art such as shown in Figure 6-5 used a mechanical device, such as a dowel, to attach the leg to the seat. And the yet further fallback feature of using plant resin as the adhesive might establish an even more defensible position.

Of course, attaching things with an adhesive solves a problem that goes far beyond chair legs. We would be remiss, then, in not exploring the possibility of patent protection for the notion of adhesive attachment generally and/or the use of plant (e.g., tree) resin for this purpose.

Our Planned Retreat for the chair is shown below in claim form, with the various fallback features in italics and the claims shown indented to illustrate their position in the overall retreat plan. The claim numbers correspond to the fallback position designations used above; for example, fallback position 2 appears in claim 6.2.

6.1. Apparatus comprising

a seat, and

means for supporting the seat above an underlying surface,

the means for supporting including *one or more elongated support members*.

6.2. The apparatus of claim 6.1 wherein the means for supporting includes *four elongated support members*.

6.3. The apparatus of claim 6.2 wherein the one or more elongated support members supports the seat substantially at its *periphery*.

6.4 The apparatus of claim 6.3 wherein the seat is substantially *rectangular* and each of the four elongated support members supports the seat substantially at a respective *corner* thereof.

6.5 The apparatus of claim 6.4 wherein the one or more elongated support members is substantially *perpendicular* to the seat.

6.6. The apparatus of claim 6.2 wherein the one or more elongated support members is substantially *perpendicular* to the seat.

6.7 The apparatus of claim 6.1 wherein the one or more elongated support members supports the seat substantially at its *periphery*.

6.8 The apparatus of claim 6.7 wherein the seat is substantially *rectangular* and each of the four elongated support members supports the seat substantially at a respective *corner* thereof.

6.9 The apparatus of claim 6.1 wherein the one or more elongated support members is substantially *perpendicular* to the seat.

6.10 The apparatus of claim 6.1 wherein the one or more elongated support members is made of *wood*.

6.11 The apparatus of claim 6.1 wherein the one or more elongated support members is permanently attached to the seat with an attachment means.

6.12. The apparatus of claim 6.11 wherein the attachment means is an adhesive.

6.13 The apparatus of claim 6.12 wherein the adhesive is *plant resin*.

Chapter Eleven presents a set of guidelines for arranging dependent claims in various combinations pursuant to the Planned Retreat strategy as exemplified by the claim family above.



This chapter ends Part I of the book, “Identifying the Invention.” We’ve identified the inventive concept in problem-solution form and have mapped out a Planned Retreat. We are now ready—indeed, primed—to draft the claims.

## Notes

1. 35 U.S.C. 112, ¶ 2.
2. See p. 6.
3. See p. 25.
4. See Chapter Three, pp. 19–28.
5. See Chapter Four, pp. 29–44.
6. For the proposition that unexpected results are an indicium of nonobviousness, see, *e.g.*, *Adams v. United States*, 383 U.S. 39, 148 USPQ 479 (1966).

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P A R T   I I

*Drafting Individual Claims*



## Introduction to Part II: Drafting Individual Claims

Drafting patent claims can be a challenging task, particularly for the novice. The specter of that blank sheet of paper or empty computer screen can be daunting.

However, if a problem-solution statement has already been developed following the principles presented in Part I, the hard part will have already been done. Problem-solution statement in hand, the patent attorney can begin his claim drafting not with an empty screen, but with a substantial kernel of inventive essence. The time invested in getting the problem-solution statement just right will now bear fruit. Far from being an isolated activity, drafting the claims becomes through this approach the capstone of a comprehensive invention-analysis process.

PART II—*Drafting Individual Claims*—shows how it is done.

CHAPTERS SEVEN and EIGHT present two techniques for drafting the patent application's broadest claims. Both techniques take advantage of all the hard work that went into developing the problem-solution statement. These two techniques complement each other, helping us to achieve a healthy measure of diversity in the claim suite—a topic discussed in Chapter Fourteen. The claim-drafting technique described in Chapter Seven is problem-solution-based claiming. It develops a claim directly from the problem-solution statement itself, with very little being added or taken away. Little thought needs to be given to the invention itself. All the thinking and analysis that went into developing the problem-solution statement gets directly applied to the claim. Chapter Eight's technique is inventive-departure-based claiming. This approach also relies heavily on the problem-solution thought process. It is more open-ended, however. The claim drafter is set free to bring her creativity to bear, resulting in a virtually limitless variety of claim structures and ways of expressing the broad invention.

Claims of intermediate and narrow scope are the subject of CHAPTER NINE. These are claims that qualify or limit the broadly claimed invention by reciting additional elements, particularizing already-recited elements, or particularizing relationships among the recited elements. One can never be sure that all the relevant prior art is in hand. Claims of

intermediate and narrow scope implement the Planned Retreat, providing somewhere to fall back to if the broadest claims turn out not to be patentable after all.

CHAPTER TEN discusses definition claims. These are claims typically in dependent form that define terminology in their parent claims to address two potential parent claim deficiencies. One potential deficiency is that the parent claim may read on prior art that does not disclose the inventive concept. The other is that the parent claim may be indefinite because either the parent claim itself or a claim that it depends from contains indefinite terminology.

The whys and wherefores of chaining dependent claims are explained in CHAPTER ELEVEN.

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## CHAPTER SEVEN

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# Problem-Solution-Based Independent Claims

The author has often thought of publishing a gag gift book entitled “Patent Claim Forms.” All of its pages would be blank. The joke is one that only a patent lawyer can fully appreciate. Every invention is different, and there is no such thing as fill-in-the-blanks claiming. This start-from-scratch aspect of claim drafting is what makes it so challenging.

The claim-drafting technique described in this chapter—problem-solution-based claim drafting—is an effective way of meeting the challenge. It arrives at a claim by transforming the problem-solution statement into claim form, with very little being added or taken away. That such a technique exists should come as no surprise. Stringham reminds us that an invention is not a thing, but a definition.<sup>1</sup> A definition is made up of words. Thus no matter what *format* we may use to define an invention—a claim or a problem-solution statement—the *words* that inform that definition ought to be pretty much the same in either case.

### The Three Steps

Problem-solution claim drafting transforms the problem-solution statement into claim form in three steps:

1. Remove the problem-related language including the boilerplate “*The problem of . . . is solved by,*” but retain language defining the environment or context in which the problem arises.
2. Stitch the remaining language into one or more claims, adding as few words as possible.
3. Compare the resulting claim(s) to the problem-solution statement to verify the accuracy of the transformation.

These three steps will readily produce claim(s) as broad as the problem-solution statement itself. If more than one problem-solution statement was created when the invention was being analyzed, corresponding claims can

be created by applying these steps to each problem-solution statement separately. To draft a claim in a particular invention setting,<sup>2</sup> the problem-solution statement should be cast in that setting.

The reader may be somewhat skeptical. It is not uncommon to spend an hour or more drafting and redrafting a claim when writing it from scratch. It is therefore reasonable to ask how three cookbook-like steps can supplant all of that. How can all the critical thinking that traditionally goes into drafting a patent claim really be so readily bypassed?

Actually, none of that critical thinking *is* bypassed. We have already brought our best thinking to bear in identifying the problem and the solution and refining them into a sharply focused invention definition. In patent work, as in life generally, there is no free lunch. But by this point we've already *paid* for lunch.

This chapter illustrates the problem-solution-based claim-drafting process with two examples. The examples illustrate options available when carrying out the stitching of step 2, as are discussed following the examples themselves. Finally, a set of questions and answers explains the underlying theory of the problem-solution-based claim-drafting technique.

## Examples of the Technique

The following are two examples of the problem-solution-based claim-drafting technique.

### Uniform Microwave Oven Heating

The first example returns to the microwave oven improvement discussed earlier.<sup>3</sup> The inventive concept is to heat food in the microwave oven more uniformly by engendering relative motion between the food and the microwave energy source within the oven cavity (main chamber of the oven), such as on a turntable. Here is the problem-solution statement:

*The problem of nonuniform heating of food in a microwave oven cavity is solved by engendering relative motion between the food and the oven's microwave energy source during the heating process.*

And here are the steps of the methodology, used in this particular case to produce both method and apparatus claims. The underscoring in the claims indicates words added in the stitching process.

- I. Remove problem-related language. ~~The problem of nonuniform heating of food in a microwave oven cavity is solved by~~ engendering relative motion between the food and the oven's microwave energy source during the heating process.



2. Stitch (method and apparatus claims).

7.1 A method comprising engendering relative motion between food in a microwave oven cavity and the oven's microwave energy source during the heating process.

7.2 Apparatus for heating food in a microwave oven cavity, the apparatus comprising a microwave energy source, and means for engendering relative motion during the heating process between the food and the microwave energy source.

3. Compare.

The reader should verify the accuracy of the transformation.

## Traffic Signal

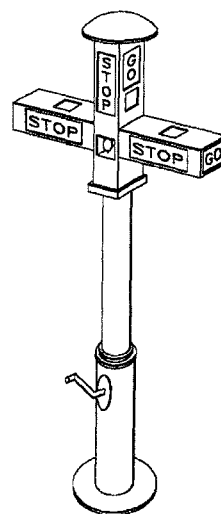
The traffic signal is our second example.

Early traffic signals were manual affairs in which “stop” and “go” placards were held up by a human operator. A major problem was that operator fatigue resulted in erratic timing of the presentation of the stop-and-go placards for the different directions of travel, confusing both drivers and pedestrians. The solution was an invention common to all modern traffic signals—namely the fact that the stop-and-go indicia change in automatic synchronism—an invention implemented in even the simple hand-cranked traffic signal shown in Figure 7-1.

Here is the problem-solution statement for this invention:

*The problem of achieving safe and orderly traffic flow at a roadway intersection is solved by a traffic signal in which the display of stop-and-go indicia for traffic on a first roadway of the intersection is automatically changed in predetermined coordination with changes in the display of stop-and-go indicia for traffic on a second roadway of the intersection.*

And below are the steps of the problem-solution-based claiming methodology applied to this problem-solution statement used, in this case, to produce two apparatus claims in two settings<sup>4</sup>—one reciting the novel traffic signal and one reciting a roadway intersection that includes the novel traffic signal. Again, underscoring in the claims indicates words that were added in the stitching process.



**FIGURE 7-1** Early traffic signal.

1. Remove problem-related language. ~~The problem of achieving safe and orderly traffic flow at a roadway intersection is solved by~~ a traffic signal in which the display of stop-and-go indicia for traffic on a first roadway of the intersection is automatically changed in predetermined coordination with changes in the display of stop-and-go indicia for traffic on a second roadway of the intersection.
2. Stitch (two apparatus claims).
 

7.3 A traffic signal comprising stop-and-go indicia for traffic at a roadway intersection, and means for causing the display of the stop-and-go indicia for traffic on a first roadway of the intersection to be automatically changed in predetermined coordination with changes in the display of the stop-and-go indicia for traffic on a second roadway of the intersection.

7.4 In combination, a roadway intersection, and a traffic signal that causes the display of stop-and-go indicia for traffic on a first roadway of the intersection to be automatically changed in predetermined coordination with changes in the display of stop-and-go indicia for traffic on a second roadway of the intersection.
3. Compare to problem-solution statement. The reader should verify the accuracy of the transformation.

## Stitching Options

There are a number of areas where the claim drafter has some options when carrying out stitching step 2.

### Preamble

The claim evolving out of the stitching process may lend itself to a short, formulaic preamble and/or to a longer preamble incorporating substantive limitations. For the microwave oven invention, for example, we found we could use both, choosing a short preamble for the method claim and a longer preamble for the apparatus claim.

7.1 A method comprising. . .

7.2 Apparatus for heating food in a microwave oven cavity, the apparatus comprising. . .

The choice typically comes down to which approach seems to work better for the problem-solution statement at hand and whether we are drafting an apparatus claim or a method claim. Often, both types of preamble work equally well.

## **Rearrangement and Repetition**

We are allowed to rearrange the language of the original problem-solution statement. Indeed, some rearrangement is usually necessary. This is fine as long as the relationships among the elements of the problem-solution statement are preserved. Repeating a few words or phrases may also be necessary to make the claim hang together.

## **Statutory Claim Type**

The problem-solution statement can be transformed into one or more of the statutory claim types: (a) method claims for “processes”; (b) apparatus claims for “machines” and “manufactures [manufactured items]”; and (c) composition claims for chemical compounds and other compositions of matter.<sup>5</sup> We saw, for example, how the problem-solution statement for our microwave oven invention was transformed into both method claim 7.1 and apparatus claim 7.2. The advantages of defining an invention using any particular statutory claim type are discussed in Chapter Thirteen.

## **Structural Elements vs. Means-Plus-Function**

Apparatus claims may recite one or more of their elements as a structural component or as a means-plus-function component,<sup>6</sup> as in claims 7.2 and 7.3. The problem-solution statement ideally expresses the invention in functional terms. It is therefore usually straightforward to transform a problem-solution statement into both a method claim and into an apparatus claim that incorporates means-plus-function limitations. If this proves difficult, the problem-solution statement should be reworked with the desired statutory claim type in mind.

A claim that includes a “means plus function” recitation must also include at least one other element because 35 U.S.C. 112, ¶ 6 allows such recitations in a claim “for a combination.”<sup>7</sup> Thus even though the “means for engendering relative motion” in apparatus claim 7.2 could have been written to parallel the engendering step of claim 7.1, claim 7.2 recites “a microwave energy source” as a separate element. This does not violate the strictures of step 2, because the microwave energy source is already in the problem-solution statement.

## **Invention Setting**

An invention setting is an environment or context in which the inventive concept is manifest. For example, one setting for our traffic signal invention is the traffic signal itself. Another setting is the roadway intersection

where the signal is installed. Claims 7.3 and 7.4 claim the invention in those two settings. Claims 7.1 and 7.2 both claim the microwave oven invention in the same setting—the oven itself. However, another setting could be the oven’s turntable if defined with sufficient particularity as to not read on other kinds of turntables.

Invention settings are treated in detail in Chapter Twelve and so will not be discussed further here except to note that a problem-solution statement usually casts the invention in a particular one of its settings. The straightforward transformation of the problem-solution statement into claim form will usually result in a claim in that same setting. If some other setting for the claim is desired, it may be possible to change or add a few words to an already formulated problem-solution statement to get it into the desired setting. However, if changing more than a word or two proves necessary, it is better to draft a new problem-solution statement with the desired setting in mind. Too much ad hoc fussing with the original problem-solution statement increases the risk of the finished claim having undue limitations or reading on the prior art.

### Questions and Answers

The following questions and answers explain the underlying theory of the problem-solution-based claiming methodology.

*Why is the problem-related language removed?*

Words in a claim that define only the problem to be solved do not enhance the claim’s patentability and, accordingly, are surplus. A claim reading on prior art is unpatentable whether or not the prior art solves the problem or recognizes its existence.<sup>8</sup> The claimed combination of elements or steps must distinguish the invention on its own merits without regard for the problem it solves.

Problem-defining language can actually be damaging. Every word in a claim “can and will be used against you in a court of law.” The Opposing Team may assert that their product or process solves a different problem from the one stated in the claim. And they will then argue that if the inventor did not intend the invention to be limited to solving any particular problem, she would not have included it in the claim. Meritorious or not, there is no point in opening the door to this kind of attack.

*Why is the language defining the environment or context retained?*

Language in the problem-solution statement defining the context or the environment is necessary to define the invention. If it

were not necessary, we would have eliminated it when vetting the problem-solution statement.

In the microwave oven invention, for example, we saw earlier that distinguishing the invention over the prior art required defining the invention in the context of a microwave oven *cavity*. Indeed that context-defining term was not removed during step 1 of the methodology.

*Why is the stitching step made so constraining?*

We worked hard to formulate a problem-solution statement that defines the invention in words that are “just right.” This is not the time to get overly creative. It is all too easy for the effort expended in bringing the problem-solution statement hard up against the prior art to become compromised if we stray too far from its original language. Adding or changing words could narrow the invention definition in unappreciated ways. There will be plenty of opportunity for claim-drafting creativity with other claim-drafting strategies, such as inventive-departure-based claiming presented in Chapter Eight.

*Why is step 3—comparing the claim to the problem-solution statement—necessary, given that the claim was produced so directly from the problem-solution statement?*

We want to assure ourselves that the transformation to the claim form was carried out accurately and that nothing untoward has happened. Here are things to check:

- Are there any claim elements (apparatus elements or method steps) in the claim not having an explicit presence in the problem-solution statement?
- Did a single functional recitation become bifurcated into two or more claim elements?
- Were any modifiers (adjectives or adverbs) having invention-limiting potential inadvertently introduced?
- Are there relationships between or among claim elements that do not exist in the problem-solution statement?

These kinds of discrepancies between the problem-solution statement and the claim can be loopholes for the Opposing Team to exploit in their quest to appropriate the essence of the inventor’s contribution while avoiding infringement. If the steps of the methodology have been followed carefully, loopholes should be few and far between.

### The Myth of the “Too-Short” Claim

The terseness of claims that typically result from problem-solution-based claiming may give the reader pause. Problem-solution-based claims are typically quite short, containing a minimum number of apparatus elements or method steps. This is the natural consequence of our efforts to minimize the number of words and limitations in the problem-solution statement.

A short claim is better than a long one. However, we sometimes hear that examiners don’t “like” claims that are too short. They “like” to see lots of structure, and lots of claim elements. In short, lots of *limitations*. As a result, many practitioners do not claim the invention as broadly as they could, anticipating that unless the claim looks “long enough,” the examiner will object to the claim based on its being, for example, functional or indefinite.

This does a disservice to the client. We have already assured ourselves that the words of the problem-solution statement define subject matter that is “statutory,” “novel,” and “nonobvious.”<sup>9</sup> Therefore, a claim based on that problem-solution statement should equally pass muster, no matter how few words or individual claim elements the claim contains. The fact that claim language may be highly functional, for example, or sets forth the invention in relatively few words, is not a proper basis for the claim to be rejected.<sup>10</sup>

Even in the absence of anticipatory prior art, examiners sometimes reject claims that they regard as too short or too functional based on the definiteness requirement of 35 U.S.C. 112, ¶ 1—the requirement that a patent should have claims “particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.”

Such rejections are improper.

A claim is indefinite only when the boundaries of the claimed subject matter cannot be understood from the claim language.<sup>11</sup> And there is nothing indefinite about a claim that defines an invention functionally rather than structurally, as in this example from an issued patent:<sup>12</sup>

7.5 A two-stroke engine having a pressurized air rail for producing an atomized fuel spray for injection into individual combustion chambers, in which oil for lubrication is atomized by metering said oil into a stream of compressed air taken from the rail or from a reservoir connected thereto and the resulting oil/air mist is injected into the crankcase directly upon points requiring lubrication.

Vigorously pursuing the rights of our clients means presenting the claims that our professional judgment says the clients are entitled to. We

need to claim the invention *proactively*—the way *we* think it needs to be defined—not *reactively*—the way the examiner wants it to be.

Having drafted such claims, we must then tenaciously advocate for their allowance.



Appendix A presents the problem-solution statements for a number of inventions, along with the claims that result by applying the claim-drafting technique presented in this chapter. The reader is encouraged to try out the technique and compare the reader's claim to the version given in the appendix.

A further, more open-ended claim-drafting technique, inventive-departure-based claiming, is presented next.

### Notes

1. See p. 5.
2. See pp. 143–151.
3. See p. 49.
4. See pp. 143–151.
5. 35 U.S.C. 101.
6. “An element in a claim for a combination may be expressed as a means or step for performing a specified function.” 35 U.S.C. 112, ¶ 6 (emphasis added).
7. *In re Hyatt*, 708 F.2d 712, 714–715, 218 USPQ 195, 197 (Fed. Cir. 1983).
8. *In re Dillon*, 892 F.2d 1554, 13 USPQ2d 1337 (Fed. Cir. 1989).
9. 35 U.S.C. 101–103.
10. *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971).
11. *In re Borkowski*, 422 F.2d 904, 164 USPQ 642 (CCPA 1970).
12. U.S. Patent 5,375,573 (issued Dec. 27, 1994).





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## CHAPTER EIGHT

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### Inventive-Departure-Based Independent Claims

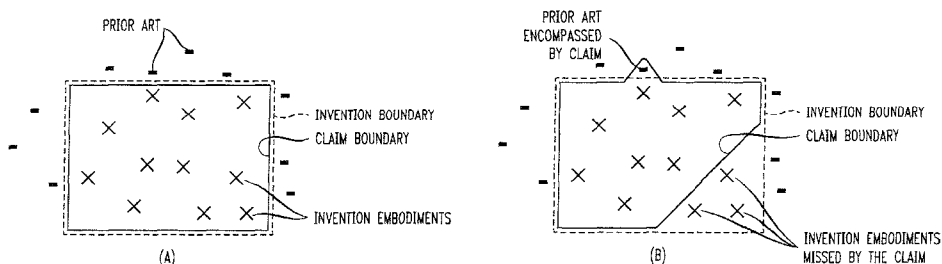
A patent should have at least one claim defining the invention as broadly as the prior art will allow. Otherwise competitors may find a way to appropriate the essence of the inventor's contribution to the art while avoiding all of the claims that *are* in the patent.

The ideal broad claim is perfectly congruent with the boundaries of the invention, encompassing all present and future implementations of the inventive concept while not reading on any prior art (Figure 8-1a). The previous chapter showed how a problem-solution statement, carefully crafted following the techniques presented in Part I, can take us a long way toward a claim that is as close to that ideal as our powers of human analysis and written expression can make it.

Our powers of analysis are hardly perfect, however. We may think we have distilled the inventive concept down to its most basic form, free of implementational details, but we may not have. The possible limiting effect of particular terminology in the problem-solution statement may have escaped our consideration. Or a potential licensee, putative infringer, judge, or jury may not interpret the claim language in the way that we or the patent examiner understood it. Our broadest claims, then, may be interpreted more narrowly than we had intended, possibly leaving some embodiments outside the boundaries defined by the claim (Figure 8-1b).

It is for these reasons that a patent application preferably includes a number of claims that each undertake to capture the invention at its full breadth. It will be harder for a competitor to design around two, three, or more claims defining the broad invention than having to design around only one such claim. Recall, for example, John Loud's ballpoint pen patent<sup>1</sup> in which one claim recited "a spheroidal marking-point" and another recited "a marking sphere capable of revolving in all directions."

Moreover, having several broad claims in the application may save the day if one of them turns out to read on "invention-irrelevant" prior art, meaning prior art that does not teach the inventive concept but



**Figure 8-1 (a) The theoretically perfect claim encompasses all possible embodiments of the invention (x) but no prior art (■). (b) But what seems to be the broadest allowable claim may turn out to be too broad in one aspect and/or too narrow in another.**

nonetheless anticipates the claim language (Figure 8-1b). In many Office actions, this is the only type of prior art cited. We saw earlier, for example, how a claim that seemed to nicely define the concept of a heavier-than-air flying machine also managed to read on birds and flying dinosaurs.<sup>2</sup> Although a particular claim may be unintentionally overbroad in this way, another may not, thereby preserving coverage for the broad invention.

The problem-solution-based claim-drafting technique presented in the previous chapter is limited in the variety of claims that it can generate. This is a significant limitation. The above considerations require that the broad invention be expressed in a number of different ways, using various formats and different recitations of elements.

Some practitioners develop independent claims using an embodiment-oriented, invention-analysis-by-claim-drafting approach. A claim directed to the embodiment is drafted. The claim is then pruned and distilled, eliminating features that are clearly optional and consolidating multiple elements or functions into broader, overarching recitations.

Claims drafted in this way may capture the *embodiment(s)* at their broadest, but may miss the real invention—a point that has been emphasized throughout the book. The paper-clip discussion in Chapter Two<sup>3</sup> is as good an example as any of how an analysis that begins from the embodiment may fail to yield a claim capturing the inventive concept, no matter how much pruning and distilling is done.

Embodiment-based claiming does have its place. Independent claims focusing on the embodiment(s) are an important component of the Planned Retreat. More about that in Chapter Nine. Moreover, sketching out a claim or two based on the embodiment(s) is a relatively painless way to get the claim-drafting juices flowing, a point discussed below under the heading “Separate What from How.” Embodiment-based

approaches leave a lot to be desired, however, when undertaking to claim the invention at its broadest.

How, then, to proceed?

There is no avoiding the need to identify the inventive concept at the outset. However, a fully thought-through problem-solution statement is not necessarily required: a less than fully formed idea of invention is sufficient to begin the process. The full breadth of the invention can be discovered as the claim takes shape. The key is to keep the goal of claiming the invention *conceptually* uppermost in our minds. This allows the claim-in-progress to be distilled down to the inventive essence. The claim itself, rather than the problem-solution statement, is what is iterated into a final, razor-sharp definition of the invention.

Central to this approach is notion of “inventive departure,” also referred to as the “inventive step,” “inventive advance,” “point of novelty,” or simply “the improvement.”

The inventive departure is a physical element, step, functionality, or a combination of these that defines how the invention departs from the prior art. In the earlier example of uniform microwave food heating,<sup>4</sup> the inventive departure is “providing relative motion between the food and the microwave source.” In our chair example,<sup>5</sup> the inventive departure is “the seat support is elongated.”

The inventive departure is akin to the solution portion of a problem-solution statement. But, the inventive departure does not have to involve a complete statement of the solution. Nor does it speak to the invention’s environment or context. This is consistent with the notion of “departure.” The inventive departure states the improvement without saying what is being improved—how the invention departs from the prior art without saying what is being departed *from*.

The inventive departures for inventions already encountered in the book are shown below. Note that the inventive departure is not necessarily a complete thought. It is more like the germ of an idea—a germ out of which a full-blown claim can grow.

Invention	Inventive departure
Ballpoint pen (p. 7)	Spheroidal marking-point
Konaclip/Gem paperclip (p. 15)	Equal pressure against opposing rails
Alarm clock (p. 22)	Alert at a selectable time
Non-dripping coffeemaker (p. 23)	Coffee flow is shut off if carafe not present
Aircraft lateral control (p. 34)	Controllable wing configuration
Microwave oven turntable (p. 49)	Relative motion between food and microwave energy source
Chair (p. 56)	Elongated support member
Traffic signal (p. 71)	Indicia are changed in coordination

The drafting of an inventive-departure-based claim starts from the inventive departure itself. The claim is built out from there, with just enough words being added to satisfy two requirements. One requirement is antecedent support for the inventive-departure-defining language. The other is defining an environment or context in which the inventive departure is novel and nonobvious.

An inventive-departure-based claim must be fussed over as carefully as a problem-solution statement. For example, the words that define the environment or context of the invention—what the inventive departure departs *from*—need to be worked over with as much care as when drafting a fully vetted problem-solution statement. The claim-drafting process, however, can begin without as much concern about exact wording in the early stages. Much of the necessary thinking and analysis can be done as the claim takes shape. Similar to problem-solution-based claim drafting, however, the inventive-departure-based approach requires ongoing focus on the invention at an abstract and functional level, lest we fall into the trap of simply cataloging piece-parts of the embodiment(s) and winding up with a claim that misses the inventive concept.

Inventive-departure-based claim drafting has three steps:

1. Identify the inventive departure;
2. Draft the claim based on the inventive departure;
3. Compare the finished claim to the problem-solution statement.

### **Step 1: Identify the Inventive Departure**

There are many ways to identify the inventive departure.

The most formal way is to develop a complete problem-solution statement. The solution portion of the problem-solution statement is, or contains, the inventive departure. Different versions of the inventive departure will arise from different versions of the problem-solution statement.

Even if the claim drafter is intent on just digging in without writing and burnishing a full problem-solution statement, the same analytical techniques that go into developing a problem-solution statement can be used to identify the inventive departure, at least preliminarily, as discussed immediately below. The claim-drafting process itself can then be used to finish the job.

### **Consider the Problem and the Solution**

We have seen throughout the book how the broad invention can be teased out of the embodiment(s) by asking what problem was intended

to be solved and how, broadly speaking, it *was* solved. Aspects of the embodiment(s) that might have initially seemed central to the invention might not seem so when the invention is analyzed from the standpoint of being the solution to some problem. Thus, even without developing a formal problem-solution statement, it is still fruitful to take a problem-solution approach when attempting to identify the inventive departure.

For example, we saw earlier that the ballpoint pen addressed the problem that the previously existing (fountain and quill) pens could not write on a rough surface.<sup>6</sup> That problem was solved by the pen having a spheroidal marking-point or, alternatively, a marking sphere capable of revolving in all directions. “Spheroidal marking-point” is one way to characterize the ballpoint pen’s inventive departure. “Marking sphere capable of revolving in all directions” is another.

### Figure Out “What’s Really Going On”

Another way of identifying the inventive departure is to ask *What’s Really Going On?* and then answering that question in functional terms. Any detail not helping to answer *What’s Really Going On?* should be suspected as being not essential to the inventive departure.

Think in terms of verbs rather than nouns; in method steps rather than structural elements. In the book’s example of uniform heating of food in a microwave oven,<sup>7</sup> the inventive departure is the verb phrase “engendering relative motion between the food and the microwave source,” rather than the noun “turntable.”

Identify what is common among the various embodiments. Thinking about alternative embodiments, including some “far-fetched” ones,<sup>8</sup> can help in this process.

Giving free rein to our technological curiosity is another way to get to the bottom of what’s really going on—taking the thing apart in the mind’s eye to understand what is going on at the 50,000-foot level.

### Separate What from How

A broad invention is not about preferred ways of solving the problem, but about solving the problem, period. *Separating What from How* means figuring out *what* solves the problem, as compared to *how* the embodiment(s) just happen to implement the solution.

The inventive departure is the *what* of this paradigm.

*Separating What from How* focuses not on what the invention *is*, but what it is *not*. An aspect of the embodiment is not intrinsic to the broad invention if the problem is at least partially solved without that aspect. It is the ball of the ballpoint pen that solves the problem of how to write on

a rough surface. All the other parts of the embodiment relate to *how* the inventive concept is implemented, and do not inform the inventive departure.

The pitfalls of an embodiment-based approach to analyzing an invention are emphasized throughout the book. See, for example, the Konaclip discussion at pp. 12–16. However, the exercise of drafting an embodiment-based claim *can* facilitate separating “what” from “how” and thereby help us identify the inventive departure. Writing down potential claim limitations and seeing how they interplay can sharpen our understanding of the inventive departure at its essence. Once having identified the inventive departure in this way, however, we should use it as the starting point for drafting a new claim using the techniques described in this chapter.

One of the author’s colleagues finds this kind of claim-drafting exercise helps him gain a broad perspective on the invention:

I begin by crafting a one-sentence statement of the invention. One must be patient and spend whatever time this takes. Then I write a claim of medium to medium-narrow scope and then roughly sketch (outline) broader claims up to the broadest claim. I don’t reach for the broadest claim in the beginning because it is the crown jewel and I want to have considered all the angles first. One can often gain a broader perspective on the invention by working the medium scope claims first.

—JPM

## Step 2: Draft the Claim Based on the Inventive Departure

Before beginning to draft the claim, we should decide on a statutory claim type for the claim—method, apparatus, or composition of matter. We should also decide on a setting in which the claim will define the invention. An invention setting is an environment or context in which the inventive concept is manifest. We saw, for example, in the previous chapter that two settings for a novel traffic signal could be (a) the traffic signal itself, and (b) a roadway intersection where the novel traffic signal is installed.<sup>9</sup> Statutory claim types and invention settings are discussed in detail in Chapters Twelve and Thirteen.

Once having decided on an invention setting and statutory claim type, and having identified the inventive departure, we are ready to draft the claim. It is assumed in what follows that the reader is familiar with claim-drafting mechanics—the need for proper antecedent basis for claim

recitations, the fact that a claim element should be affirmatively recited only once in a given claim, and similar claim-drafting standards.<sup>10</sup>

### **Begin with the End in Mind**

In his book *The 7 Habits of Highly Effective People*,<sup>11</sup> personal effectiveness author Stephen Covey urges readers to “begin with the end in mind.” Being effective in life, Covey says, requires first deciding what one’s goals are. That goal is Covey’s “end in mind.” Once a goal is clearly in mind, action can be taken to achieve it.

Beginning with the end in mind is also a powerful claim-drafting paradigm. The “end in mind” is the inventive departure. The claim drafting begins by writing down the inventive departure—typically as a method step or an apparatus element. The process proceeds backward from there. The claim is completed by adding only so much additional language as necessary to do two things:

1. Provide *antecedent support* for the language used to express the inventive departure;
2. If necessary, put the inventive departure into a *particular context* in which the claimed subject matter is novel and nonobvious.

Working backward from the inventive departure helps ensure that only essential limitations make their way into the claim. It also helps for us to take on the mind-set of the Opposing Team, as one of the author’s colleagues observed when describing his approach to inventive-departure claiming:

I focus on the departure or difference from the prior art that the invention contains and build a claim around that. Drafting the claim is then a matter of writing something down that recites the difference and then *thinking of ways to avoid the language of the claim*, yet still practice the invention. This forces you to think of generic terms that keep that from happening. Of course, removing limitations that are not needed in order to provide a context for the inventive distinction is part of that process.

—HLN

We return to the book’s microwave oven uniform food-heating invention for an example of the technique. Recall that the inventive departure is the idea of engendering relative motion between the food being heated

and the oven's microwave energy source.<sup>12</sup> Let us draft a method claim, beginning by writing a generic preamble and a "payoff limitation" that states that inventive departure. The remainder of the claim is blank at this point:

**8.1 A method . . .**

. . . engendering relative motion between the food and the microwave energy source.

Applying criterion (1) above, we see that antecedent support is required for "the food" and "the microwave energy source." That support can be put in the claim preamble, at which point all antecedent problems are resolved:

**8.2 A method for heating food in a microwave oven, the oven including a microwave energy source, the method comprising**

engendering relative motion between the food and the oven's microwave energy source.

Applying criterion (2) above, recall<sup>13</sup> that the prior art knew to heat food by conveying it across the open end of a microwave waveguide, but that the prior art is overcome by putting the invention into the context of a microwave oven "cavity." We therefore add the word "cavity" to the claim, and we're done!

**8.3 A method for heating food in a microwave oven cavity, the oven including a microwave energy source, the method comprising engendering relative motion between the food and the oven's microwave energy source.**

The above is a simple example. The balance of this chapter presents further ideas for drafting inventive-departure-based claims with "the end in mind" to help implement the technique when the inventions are more complex.

## **Pack Only What You Need**

The process of working backward from the inventive departure is summarized by the prescription *Pack Only What You Need*.

Claim drafting can be compared to packing clothes for a winter vacation. Whether you pack your heavy outerwear, or your shorts and swim-



suit, depends on where you're going—to the Rockies for skiing, or the Caribbean for golf and the beach. You certainly wouldn't pack for both destinations, but take only what you need.

In the claim-drafting context, the "destination" is the inventive departure. You can't know whether you should "pack" a particular limitation into a claim until you know what inventive departure you are heading for.

Should a microwave oven claim recite a "means for selecting a power level"? Not if the inventive departure is the idea of engendering relative motion between the food and the microwave energy source. The food is heated uniformly with or without a power-level control.

Should a claim directed to a chair invention include a "means for supporting the back of the sitter"? Not if the invention is the use of elongated support members. The problem of chair portability solved by elongated support members is solved equally well whether or not the chair has a back.

Determining whether a limitation is necessary to define an invention is often not so clear when reviewing a claim already written. Working backward from the inventive departure and packing only what you need avoids having to ferret out unnecessary limitations after they have inveigled their way into the fabric of the claim.

The prescription *Pack What You Need* applies not only to the body of a claim but also its preamble. In fact, the preamble is frequently where undue limitations show up.

Unnecessary limitations typically fall into one of four categories:

1. Descriptive labels and modifiers
2. Unnecessary elements
3. Advantages of the invention
4. Intended use of the invention

Let us consider each of these types of limitations in turn in the preamble context, recognizing that such limitations can *also* be unduly narrowing when appearing in the *body* of the claim.

#### *Descriptive labels and modifiers*

Descriptive labels and modifiers in a preamble rarely buy any patentability but yet may be given limiting effect when it comes time to enforce the claim.

For example, claim 8.4 is a method claim at issue in a Federal Circuit infringement case.<sup>14</sup>

8.4 A process of preparing *block* copolymers from ethylene and propylene monomers, which comprises alternately polymerizing one of said monomers and a mixture of said monomers in the presence of a catalyst comprising a titanium halide and an aluminum alkyl compound.

Note the mention of *block* copolymers appearing only in the preamble. The main disclosed embodiments were, in fact, block copolymers; but it appears that this claim would have been allowed without the term “block” in its preamble. An accused infringer’s copolymers were not block copolymers, however, and the court found the claim not infringed, even though the accused copolymers met the claim language in every other respect.

As a second example, consider claim 8.5.

8.5 An *automobile* floor mat comprising

a semi-rigid monolayer having a gradually sloping edge portion extending outward from a central section, said edge portion terminating in a lip disposed at an elevation above the central portion, the lip having a plurality of indentations disposed at regular intervals around its periphery.

The descriptive label “automobile” buys no patentability in claim 8.5, because a preamble claim term is not given any patentable weight if it doesn’t tie into the rest of the claim.<sup>15</sup> There is no tie-in here. Similar to the block copolymer case, there is nothing in the body of the claim that intrinsically limits the defined structure to being an *automobile* floor mat. Thus if the examiner finds a prior art mat described by the body of the claim, he will reject the claim whether or not the prior art mat was designed for use in an automobile (or, for that matter, intended to be placed on a floor).

Although the descriptive label “automobile” will be of no help in securing *allowance* of this claim, it will come back to bite us when we go to *enforce* the claim, just as in the block copolymer case. The patent owner could be out of luck if the Opposing Team uses the claimed semi-rigid monolayer to construct mats intended for use in trucks or locomotive cabs and that are not capable of being used in automobiles due to, for example, the mats’ size or shape.

Claim 8.6 presents a third example of descriptive preamble labels or modifiers that can get us in trouble. The claim is directed to a telescoping radio/TV antenna, which the claim calls “an extendible and retractable structure.”

**8.6 An extendible and retractable structure comprising**

a plurality of structural sections, mounted to be slidable in the direction of their length relative to

each other, each structural section including [details omitted] . . .

The uniqueness of this antenna is the particular conformation of the sliding structural sections as recited in the details omitted from the claim above. The recited geometry of those sections and their arrangement in the finished antenna is what renders the structure “extendible and retractable.” The terms “extendible” and “retractable” in the preamble are, therefore, redundant and do not enhance the claim’s patentability. Yet, a competitor’s antenna having sections exactly like the inventor’s may be designed to permanently lock the sections in place when the antenna is initially extended. Such an antenna might be intended for delivery to a remote site—like a mountaintop or Mars—extended in place, and left for good. Because the sections are permanently locked in place once extended, the antenna is arguably non-retractable and, as a result, non-infringing.

Undue limitations like these can be avoided by not packing a limitation into the preamble until the structure of the evolving claim makes it clear that it is needed. A good practice is to start with the simplest preamble possible, such as “A method comprising. . . .” As the claim begins to take shape, it may turn out that the preamble is, in fact, the best place for certain limitations. That’s fine. Preamble limitations will be given limiting effect, thereby supporting a claim’s patentability, if they tie into the rest of the claim recitations.

*Unnecessary Elements*

Working a claim bottom-up from the inventive departure rather than top-down from the preamble can help keep not only unnecessary labels and modifiers out of the preamble, but entire elements as well.

For example, claim 8.7 is directed to a method for operating an engine in which the inventive departure involves using a fuel containing certain additives to keep the engine parts clean.

**8.7 A method for operating an engine having a fuel pump, said method comprising:**

operating said engine using a fuel containing [certain recited additives] under conditions sufficient to clean performance-inhibiting deposits from said fuel pump or other fuel system elements.

Although the inventor was primarily concerned about fuel pump deposits, the claim drafter, thinking broadly, structured the claim to recite that the deposits were cleaned from the “fuel pump *or* other fuel system elements.” This is all to the good. Unfortunately, the preamble explicitly limits the claimed method to an environment that includes a fuel pump. An accused infringer whose engine does not have a fuel pump will argue that this claim does not apply to him.

This claim bears the telltale evidence of a preamble that was drafted before the rest of the claim. The preamble probably includes the phrase “having a fuel pump” because the claim drafter was focused on the embodiment. If the body of the claim had been written *before* the preamble, it would probably have been drafted to call for deposits being cleaned from “fuel system elements” or even from “a fuel pump or other fuel system elements.” There would then have been no impetus to pack a “fuel pump” limitation into the preamble, because the claim would have been complete without it.

#### *Advantages or Intended Use of the Invention*

Finally, in the following examples, the preamble language explains an advantage or intended use for the invention. As such, the preamble potentially limits the applicability of the claim to potential infringers without the claim gaining patentability in return:

Preamble	Infringement-Avoidance Scenario:
A high speed rotor of a type <i>applicable for use with a flywheel</i> , the rotor comprising [no flywheel mentioned in the rest of the claim] . . .	The alleged infringer discovers a non-flywheel-based application for the novel rotor.
An optical system in which at least two out of phase light beams of different frequencies are combined <i>with improved output efficiency</i> . . .	The alleged infringer selects an operating parameter for the optical system to achieve increased processing speed without the improved output efficiency that the claim calls for.
An on-chip debug system for a programmable <i>very-large-scale-integration</i> (VLSI) processor . . .	The level of integration regarded in the industry as being “very large scale” constantly changes as advances in technology enable components to be made increasingly smaller. The alleged infringer, whose processor uses a state-of-the-art level of integration, argues that VLSI should be interpreted to mean what it meant at the time the patent application was filed.

## Define, Don't Explain

Patent attorneys love to explain things. This is great when we are writing the specification. But it can get in the way when drafting claims. It is hard to resist the urge to liven up a claim's dull litany of elements by explaining that the claimed subject matter is an *automobile* floor mat; or an optical system with *improved output efficiency*; or a rotor *applicable for use with a flywheel*.

That urge to explain must be resisted nonetheless.

A claim's function is to define the boundaries of the patent owner's intellectual property, not to explain or help readers to understand something. An explanatory-type limitation may seem harmless enough, but we need to take it as an article of faith that every extra word in a claim is a potential loophole for infringers to exploit.

Limitations should be suspected of explaining rather than defining if they set forth any of the following:

- The advantage of the invention, or what it is "good for";
- How the recited combination can integrate with the external environment;
- Motivations (e.g., for doing a particular step or including a particular element);
- How to carry out a recited function where the recitation of the function itself imbues the claim with patentability;
- How inputs get generated;
- The source of something that the claimed method or apparatus works on.

We should consider deleting any limitation that meets one of these criteria. If the claim distinguishes over the prior art without the limitation, it isn't necessary to the invention and the claim is well rid of it.

We have seen examples of limitations meeting some of the above criteria in the previous discussion of claim preambles. The following are further examples of claims with explanatory language, but in these examples they are in the body of the claim. The lined-out material in the examples is merely explanatory and thus can be deleted. Underscoring in some of the examples designates language inserted to complete the claim once the lined-out language has been removed.

In claim 8.8, the "enabling" step serves only to provide a motivation for providing the novel message content of the "inserting" step. It is only the latter that imparts novelty to the claim, which is equally patentable without the "enabling" step.

8.8 A method for use by a transmitting terminal, the method comprising

~~enabling a receiving terminal to determine if messages transmitted by the transmitting terminal are being missed, the enabling including inserting into each message that originates from the transmitting terminal (a) an identification of the transmitting terminal and (b) a sequence character that is advanced for every N messages transmitted by the transmitting terminal.~~

In claim 8.9 the fact that the recited apparatus may include a timer as a way of measuring the time interval in question merely explains how to carry out the function of the “means for redirecting.” The claim is equally patentable without reciting the timer.

8.9 Apparatus for processing a message, comprising  
~~a timer, and~~

means for redirecting the message from a primary location to a secondary location if a predetermined interval ~~timed by the timer~~ expires before the message has been acted upon at the primary location, . . .

Claim 8.10 illustrates the power of the phrase “as a function of” as the key to eliminating claim elements that merely explain how to carry out a function that is novel in and of itself. The inventive departure in this claim is forming a data symbol decision based on a certain sum. That sum is generated in the penultimate step in the original claim.

8.10 A method for forming a decision as to the value of a data symbol carried in a data signal, the method comprising  
~~receiving the data signal,~~  
~~generating samples of the data signal,~~  
~~generating a plurality of coefficients,~~  
~~multiplying the coefficients with respective ones of the samples,~~  
~~generating a sum of the resulting products, and~~  
 forming the data symbol decision based on said sum as a function of the sum of the products of a plurality of coefficients with respective samples of the data signal.

In the revised claim, the phrase “as a function of” enables the final, “forming” step to treat the sum produced by the five preceding steps of the original claim as a computational *fait accompli*. Six steps in the original claim are thereby coalesced into one.

The advantage of claim 8.10 in its revised form is huge. We would be hard-pressed to prove that each of the individual steps of the original claim is carried out in our competitor's embodiment. The advantages would be even greater in the case of an apparatus (means-plus-function) version of claim 8.10, since it may be difficult to prove that the competitor's product has six individual "means." Moreover, the competitor's product might not even carry out one or more of the generating steps, or the multiplying step. Rather, the competitor's product might use a lookup table in which precomputed results for the various computations and/or precomputed coefficients are stored.

Claim 8.11 illustrates the use of the phrase "in such a way that" to similar effect. The inventive departure, as set forth in the last paragraph of the claim, is the idea of adjusting a sampling phase in a data equalizer in such a way that two coefficients used in the equalizer are kept substantially equal to one another:

8.11 A method comprising

forming a decision as to data symbols carried by a data signal in response to the sum of the products of an ordered plurality of coefficients with respective samples of the signal,  
periodically updating the values of said coefficients, and  
adjusting the phase with which the samples are formed *in such a way that* an adjacent pair of the coefficients are maintained substantially equal to each other.

Note that this claim doesn't explain how the sampling phase is adjusted to keep the two coefficients equal to one another; adjusting the sampling phase to achieve the equality was the inventive departure in and of itself. Note, too, that claim 8.11 avoids reciting any motivation for the method in that it doesn't explain why one would *want* to keep the coefficients equal to one another. That is the role of the specification. Defining the invention requires us only to recite that the sampling phase is adjusted in such a way as to achieve the recited equality, how *ever* that might be accomplished.

In the end, however, there is perhaps no better exemplar of a claim that follows the prescription *Define, Don't Explain* than the ballpoint pen claim drafted by patent attorney William Dowss:<sup>16</sup>

8.12 A pen having a spheroidal marking-point, substantially as described.

A working ballpoint pen needs to have some way to hold the marking-point in place, and the pen needs some way for the marking-point to be

inked. But claim 8.12 doesn't explain any of that. Nor did it need to. Dowss's claim serves as a powerful reminder of how precisely an invention can be claimed by hewing to the principle that the function of a claim is not to *explain* the embodiment(s), but to *define* the invention.

### **Use Functional Recitations to Minimize the Number of Claim Elements**

Infringement loopholes become increasingly likely as the number of individual claim elements increases. Given a dozen individual claim elements, a determined competitor will undoubtedly be able to find a way to implement all of their functions with only eleven elements, or with only ten or with nine, thereby implementing the inventor's teachings but avoiding literal infringement.

Pruning and distilling the claim goes a long way toward closing up any such loopholes in both method and apparatus claims. However, another way of eliminating potential loopholes in apparatus claims is to recite a specific limitation in functional terms without calling for a specific structure by which to do it. For example, the following claim incorporates the *function* of a hinge without reciting the hinge itself:

#### **8.13 Apparatus comprising**

a door frame,

a door mounted on said door frame in such a way that it can swing into and out of the plane of the door frame,

...

These considerations apply not only to independent claims like claim 8.13, but dependent claims as well.

For example, claim 8.14 recites a "processing means" that generates a revised version of an input signal. Its dependent claim 8.15 calls for an explicit structural element, reciting that the processing means includes a separate "means for encoding the input signal." By contrast, dependent claim 8.16 presents that encoding functionally, reciting that the processing means "encodes the input" signal without calling for a separate element to do so.

#### **8.14. Apparatus comprising**

means for receiving an input signal,

processing means for generating a revised version of the input signal,

...



8.15. The apparatus of claim 8.14 wherein the processing means includes means for encoding the input signal to generate the revised version.

8.16. The apparatus of claim 8.14 wherein the processing means encodes the input signal to generate the revised version.

### Scrutinize Every Modifier

Beware the insidious modifier, particularly adjectives. Most of them are unnecessary in a broad claim, serving to explain rather than define. Each modifier in a claim should be scrutinized to see if the claim will support patentability without it. If so, the modifier is probably expendable.

Examples from earlier in this chapter include *automobile* floor mat,<sup>17</sup> *block copolymer*,<sup>18</sup> and *very-large-scale* integration.<sup>19</sup> Here are some other examples:

Claim Language	Infringement-Avoidance Scenario
Decoding a <i>transmitted</i> video signal by . . .	Opposing Team carries out all the steps of the claim except that the video signal was not “transmitted” from anywhere but read out of a storage device.
<i>High-resolution</i> filter	Opposing Team asserts that their filter does not meet the limitation “high-resolution,” because there are filters that have even higher resolution than theirs.
<i>Rapidly</i> removable label	Opposing Team asserts that their label isn’t any more rapidly removable than is typical and therefore not “rapidly” removable.

The patent owner may have a comeback for such Opposing Team challenges. But the real question is, *What are these limitations doing here?* If a particular modifier is needed in order to define the invention in view of the prior art, that is one thing. But if not helping define the invention, the modifier is only serving to explain something about the embodiment, and the claim could just as easily have been allowed without it.

Another potential problem for certain modifiers is their potential for being declared indefinite. The terms “high-resolution” and “rapidly” certainly fit this category. Claim indefiniteness is discussed in further detail in Chapter Ten.<sup>20</sup>

### Be Sure the Claim Says What You Mean

Claims sometimes don’t say what we mean them to say.

The following are typical examples of claim language gone awry, based on claim language reported in cases or personally encountered by the author.

The ways in which misstatements can arise are, of course, innumerable. These examples, then, are simply illustrative of the need to be sensitive to what our words really mean.

*"Heating said block of material to 500°F"*

Consider a process in which, according to the specification, a block of material should be put in a 500°F oven. A claim drafter not paying close attention to what his words mean might recite this step as "heating said block of material to 500°F."

This recitation is inaccurate. What it says is that the block of material is heated until the material itself reaches 500°F, not that the material is put in a 500 °F environment. A competitor following the teachings of the specification by putting the material in a 500°F oven for some period of time but removing it before the material itself reaches 500°F does not infringe the claim. Moreover, the claim is invalid as not pointing out "that which the applicant regards as the invention."<sup>21</sup>

The correct recitation would be "putting said block of material in a 500°F environment."

*"First and second transistors having first and second emitters"*

This recitation is ambiguous. A transistor can have one, two, or more emitters, raising the question in this case as to whether (a) the first transistor has the first emitter and the second transistor has the second emitter, or (b) the first transistor has first and second emitters and the second transistor also has its own separate first and second emitters. The recitation should be made clear by reciting whichever of these meanings is intended:

- a first transistor having a first emitter and a second transistor having a second emitter

OR

- first and second transistors *each* having first and second emitters

*"Wherein"*

Claim drafters develop a lexicon of pet words and phrases. We have gotten so used to them that they are skimmed over when a claim is

reviewed because they fit a pattern or “sound right” even when they don’t belong or don’t mean what we intended.

The word “wherein” is one of the most widely misused words in patent claims. It means “in which,” and, accordingly, is perfectly fine in constructions such as:

The apparatus of claim 1 *wherein* the top surface of said armrest is other than horizontal.

The method of claim 1 further comprising tumbling the gem in an abrasive medium *wherein* silicon carbide is one of the medium’s abrasive components.

These claims make perfect sense if the word “wherein” is replaced by its synonym “in which.”

By contrast, “wherein” is improperly used in the following recitation, as is made clear by replacing “wherein” with “in which:”

... a wheel that perforates the card stock, *wherein* the card stock is held in place during the perforating ...

What does the “wherein” refer to here? In *what* is the card stock held in place? The wheel? The card stock? Neither of these constructions make any sense. This recitation would be better cast as

... a wheel that perforates the card stock, the card stock being held in place during the perforating ...

The author has often thought of marketing a novelty item for patent lawyers: a sweatshirt bearing the slogan “Words Matter.” The above examples illustrate that indeed they do.

### **Assume That Input Signals and Data/Parameter Values Are Already in Hand—Don’t Generate Them in the Claim**

Both apparatus and methods often operate on input signals or may use data values, parameters, measurements, counts of things, and so forth. When claiming the broad invention, however, it is usually desirable to treat input signals, data/parameter values and the like as already existing—handed to us by a genie, perhaps—rather than explicitly generating them within the claim. For example, we saw in claim 8.10 how *six* claim steps could be coalesced into *one* claim step by treating the sum that is

used to form the data symbol decision as an already existing or available quantity rather than by generating that sum in the claim.

As another example, suppose the invention is the idea of adjusting the output rate of a manufacturing process once the number of widgets produced within the previous hour reaches a certain limit. The invention *could* be defined in two steps—a counting step and an adjusting step:

8.17 A method for use in a machine that manufactures widgets, the method comprising  
counting the number of widgets manufactured in an hour's time, and  
adjusting the output rate of said machine when the count reaches a predefined limit.

Note, however, that it is irrelevant to the inventive concept *how* the number of widgets manufactured in an hour is determined. Indeed, instead of counting the widgets, the Opposing Team might use the cumulative weight of an hour's output to determine how many widgets were produced and, in so doing, avoid a literal infringement of claim 8.17.

By assuming that the widget count is already in hand and available to the adjusting step, the entire counting step can be eliminated:

8.18 A method for use in a machine that manufactures widgets, the method comprising  
adjusting the output rate of said machine when the number of widgets manufactured within an hour's time reaches a predefined limit.

In a similar vein, we can assume that an originally analog, but now digital, signal operated on within a claim has been handed to us in digital form when the inventive process set forth in the claim begins to operate on the signal. A claim explicitly reciting an analog-to-digital converter or conversion step may well prove to be an unfortunate limitation, as in the following scenario reported to the author:

A claim I once litigated called for an analog-to-digital converter to convert analog signals received by a cellular telephone base station into digital form for further processing. The problem was that by the time the patent was in litigation—ten years after it had been filed—no one was connecting analog lines to base stations anymore; most (or all) telephone lines connected to base stations delivered signals to the base station *already* in digital form. It was irrelevant to the “real” invention whether the digital

signals were *received* digitally or *converted locally* in the base station and so A/D conversion added nothing to the validity of the claim. It just pulled in an extra element that created real problems for us in making out the case for infringement.

—MJF

The reader will recognize how inclusion of the A-to-D converter in the claim of the above story violated any number of the prescriptions set forth in the book, including the prescription, *Define, Don't Explain*.<sup>22</sup>

### Save Dependent Claim Limitations for the Dependent Claims

Supervising attorneys sometimes encounter a limitation in a trainee's claim that serves no purpose in the claim. When asked why the limitation is there, the trainee may explain, "I need it to support the dependent claim." Claims 8.19 and 8.20 exemplify this. Claim 8.19 is the parent claim on which claim 8.20 is dependent. The parent claim is burdened by a fuel pump limitation that is meaningful only in the dependent claim.

This is a claim-drafting error. A parent claim should not be burdened with limitations needed only to support a dependent claim recitation. Whatever antecedent support is needed for a dependent claim should be put into *that* claim, not its parent. This is a further illustration of the prescription *Pack Only What You Need*.

The fix is incorporated into claims 8.21 and 8.22. Parent claim 8.21 has become unburdened of the fuel pump limitation, which is now totally contained within the dependent claim 8.22.

#### **"Burdened" Parent**

8.19 An engine comprising a fuel system *including a fuel pump*, and means for injecting first and second types of fuel into said fuel system in such a way that . . .

8.20 The invention of claim 8.19 wherein *said fuel pump* includes a diaphragm and wherein at least one of said types of fuel is sprayed onto said diaphragm.

#### **"Unburdened" Parent**

8.21 An engine comprising a fuel system, and means for injecting first and second types of fuel into said fuel system in such a way that . . .

8.22 The invention of claim 8.21 wherein *said fuel system includes a fuel pump*, wherein said fuel pump includes a diaphragm and wherein at least one of said types of fuel is sprayed onto said diaphragm.

If it proves awkward to introduce the necessary antecedent support into a dependent claim, the claim can always be written in independent form and the limitation introduced there.

### **Write the Claim Out of Your Head, Not Off the Drawing**

Many practitioners refer to the patent application drawings when drafting claims. This is useful when intermediate- or narrow-scope claims are being drafted<sup>23</sup> since such claims intentionally incorporate embodiment details.

However, the drawings may interfere with the required conceptual thinking that is so desirable when we are drafting broad claims. As Stringham reminds us,<sup>24</sup> an invention is an abstraction, not something tangible. Yet, it is all too easy for the drawings to draw our attention away from the abstract, exposing us to the siren song of the embodiment and its tangible details—details that can unduly narrow a claim.

It is much harder to be attracted to embodiment details when they are not staring up at us from the drawing. Thus the broadest claims should be written directly out of the claim drafter's head. The mind's eye should be able to so clearly see those few functionalities and interrelationships that define the broad invention as to render reference to the drawing unnecessary.

If we find ourselves unable to write the claim without looking at the drawings, it may be time to stop and reengage the invention conceptually. Only when a crystal-clear answer to the question *What Is the Invention?* is in hand should we return to the claim drafting per se. Indeed, the author finds that once the inventive concept is fixed in his mind, the drawings and their details can become an out-and-out distraction from the enjoyable activity of engaging the invention and drafting claims in the purely conceptual realm.

### **Strive for Simplicity**

Simplicity is a key to clarity. Convoluted interrelationships or claim language that is difficult to read through can signal that the invention has not been captured at its essence. Often buried in such a claim are ambiguities or unduly limiting recitations that aren't necessary to the invention.

The architectural philosophy of *form follows function* applies here. A claim whose *form* is clean and simple is more likely to serve the *function* of defining the invention cleanly and simply (read "broadly"). The hallmark of a well-written claim is one that inventor can understand without a lot of attorney explanation.

Once it becomes apparent that a claim-in-progress is evolving into an awkward mess, it is best to stop and rethink the approach. Often the cul-

prit is that the limitations are introduced in a less-than-optimal order. Indeed, limitations that had seemed so necessary may simply fall away once the claim elements are rearranged.

Another clue that there is some underlying flaw or untoward assumption about the claim structure is when we find ourselves churning the claim—working and reworking, flip-flopping between certain ways of expressing or arranging the limitations and being never satisfied with the result. We may have been assuming that a particular element needs to be introduced in the claim before other(s), but that may not be so. Other possibilities are that too much or too little has been placed in the preamble, or that the claim is not being tightly enough focused on the selected invention setting.

There is little point in fighting a recalcitrant claim. Efforts to wrestle it into submission may well prove to be futile in any event. Better to look for that underlying assumption and start over. It can be hard to force ourselves to put on the brakes and abandon a claim when a lot of time has already been invested. It is therefore a good idea to stay alert to the possibility that things are beginning to deteriorate and to regroup sooner rather than later.

### **Step 3: Use the Problem-Solution Statement as a Benchmark**

The problem-solution statement is a benchmark against which all claims can be measured.

Presuming that we intended to write a claim that captures the invention at its broadest, we should assure ourselves that all of the claim's steps, elements, and so forth should really be there. Anything in a claim that does not appear in the problem-solution statement is suspect and should be critically evaluated.



This chapter and the previous chapter provide two approaches to drafting claims that define the invention as broadly as we believe the prior art allows us to. We also need to develop intermediate- and narrow-scope claims to implement a Planned Retreat for the invention because other prior art may lurk in the patent's future. Claims of less than fully broad scope serve other functions, as well. All of that is addressed next.

### **Notes**

1. See pp. 6–7.
2. See p. 35.

3. See pp. 12–16.
4. See p. 49.
5. See p. 56.
6. See p. 8.
7. See p. 49.
8. See p. 35.
9. See p. 71.
10. For claim drafting guidance, see, *e.g.*, ROBERT C. FABER & JOHN L. LANDIS, *LANDIS ON MECHANICS OF PATENT CLAIM DRAFTING* (New York: Practising Law Institute, 4th ed., 1997).
11. STEPHEN R. COVEY, *THE 7 HABITS OF HIGHLY EFFECTIVE PEOPLE* (New York: Fireside, 1989), p. 95.
12. See p. 49.
13. See p. 50.
14. *Phillips Petroleum Co. v. Huntsman Polymers Corp.*, 157 F.3d 866, 48 USPQ2d 1161 (Fed. Cir. 1998) (affirmed summary judgment of non-infringement).
15. See, *e.g.*, *In re Hirao*, 535 F.2d 67, 70, 190 USPQ 15 17-18 (CCPA 1976); *In re Pearson*, 494 F.2d 1399, 1402–1403, 181 USPQ 641, 643–644 (CCPA 1974).
16. See p. 7.
17. See p. 88.
18. See p. 88.
19. See p. 90.
20. See pp. 118–119.
21. 35 U.S.C. 112, ¶ 2.
22. See p. 91.
23. See Chapter Nine, pp. 103–114.
24. See p. 5.



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## CHAPTER NINE

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# Intermediate- and Narrow-Scope Claims

A patent application should be filed not only with claims defining the invention at its broadest, but with claims of intermediate and narrow scope as well. A claim of intermediate scope includes perhaps one, two, or three limitations not required to define the broad invention. A claim of narrow scope includes even more.

Intermediate- and narrow-scope claims serve a number of functions. Most importantly, they implement a Planned Retreat for the invention so that if prior art makes it necessary to retreat from the application's broadest claims, those that remain will have given up as little valuable intellectual property as possible while providing a defensible position for what's left.<sup>1</sup> That and other functions of intermediate- and narrow-scope claims are discussed in this chapter.

### Fallback Feature Claims

Fallback feature claims are the Planned Retreat's front line of defense and are a mainstay of patent claiming practice. A fallback feature claim is typically in dependent form and narrows the subject matter of the claim from which it depends—its "parent"—by reciting a feature of the invention that may be relied on for patentability if prior art renders the parent claim unpatentable.

Drafting a set of fallback feature claims is usually straightforward once the fallback features have been identified. Identifying the fallback features themselves is the heart of the matter. Chapter Six presents a problem-solution-based process for doing so. Per that process, the broad invention is regarded as being in the prior art for analysis purposes. A problem-solution analysis is then carried out based on that assumed prior art. The reader may wish to refer back to that discussion at this point.<sup>2</sup>

A fallback feature claim can add its subject matter to its parent claim in various ways, depending on the nature of the feature itself. A fallback

feature claim can further limit the subject matter of its parent by (a) adding one or more additional elements to the elements contained in the parent claim; (b) particularizing an already recited element in the parent claim; or (c) particularizing the relationship between already recited elements. Those three alternatives are illustrated by dependent claims 9.2 through 9.4 of the following claim family defining the pencil:

9.1 A writing implement comprising

a rod made of a material that is transferred to a writing surface when the rod is moved across a writing surface, and

an encasement for the rod.

9.2 The invention of claim 9.1 further comprising

eraser means affixed to an end of the writing implement, the eraser means being adapted to remove the transferred material from the writing surface when the eraser means is rubbed thereon. (Adds an element)

9.3 The invention of claim 9.1 wherein the rod is made of graphite and the encasement is made of wood. (Particularizes elements)

9.4 The invention of claim 9.1 wherein the encasement is in the form of a cylinder and the rod is disposed along the central axis of the cylinder. (Particularizes a relationship)

Guidelines for assembling the fallback feature claims (and definition claims<sup>3</sup>) into claim families are presented in Chapter Eleven.

### Claim Differentiation Claims

The doctrine of claim differentiation is sometimes advanced as a reason to include claims of intermediate and narrow scope in a patent application. This rule of claim interpretation provides that when an independent claim is limited by recitations in a dependent claim, the first claim must be regarded as being broader. Otherwise the second claim would be superfluous, something that is “presumptively unreasonable.”<sup>4</sup> A dependent claim included in a claim family with this doctrine in mind is here referred to as a claim differentiation claim.

Consider, for example, claim 9.6, reciting that the elongated support member (chair leg) of claim 9.5 is cylindrical.

9.5. Apparatus comprising

a seat, and

means for supporting said seat above an underlying surface,

the means for supporting including one or more elongated support members.

9.6 The apparatus of claim 9.5 wherein the one or more elongated support members are cylindrical.

The fact that claim 9.5 has a dependent claim stating that the chair legs are cylindrical supports an argument that claim 9.5 should not be interpreted as being limited to legs that are cylindrical, even if every chair leg disclosed in the specification is cylindrical.

The doctrine of claim differentiation is usually invoked in litigation when the patent owner needs a claim term to be interpreted expansively to make it read on the accused product or process. Anticipating the day when their claims may be litigated, attorneys sometimes include claim differentiation claims in their applications as a way of bolstering the case for a broad interpretation of the claims from which they depend. Such a claim might not otherwise be included in the claim suite if the limitation in question did not constitute a meaningful fallback feature.

There is no harm in having claims of this type in the claim suite. They may not carry the day, however. The doctrine of claim differentiation is only a guide to claim construction, not a rigid rule.<sup>5</sup> Certainly the Opposing Team will argue against the application of the doctrine or at least against the particular interpretation being argued by the patent owner.

A more reliable way of ensuring that claim language is interpreted broadly is to point out explicitly in the specification that certain illustrative details of the embodiments are no more than that—illustrative details—and that there are, or at least may be, alternatives. Even better is to present examples of such alternatives. In the chair example, the specification would explicitly make the point that the chair legs need not be cylindrical:

Although the elongated support members of the sitting devices disclosed herein are cylindrical, that is, have circular cross sections, other cross sections are possible, including cross sections that are squares or ovals or are non-regular in shape, as well as cross sections that vary in shape along the length of the member.

### **Independent Embodiment Claims**

An independent embodiment claim is a claim in independent form that includes one or more details of the disclosed embodiment(s)—details not included in claims intending to define the invention at its full breadth. As such, an independent embodiment claim necessarily stakes out a more

modest parcel of intellectual property than the application's broadest independent claims.

It might seem that there is no need for such claims. After all, we can always include embodiment details in one or more *dependent* claims. However, as we will see, independent embodiment claims can close up potential infringement loopholes, and overcome other problems, that are actually created by claims being in dependent form.

### The Question of Breadth

An independent claim reciting specific embodiment details can actually be broader than a dependent claim reciting those same details. The reason is that the details in a dependent claim may render certain limitations in its parent claim(s) redundant. A dependent claim is always burdened with all of its parent's limitations—redundant or not—and we should take it as a matter of faith that any redundant words in a claim have the potential to narrow it, even if the redundant words seem “harmless enough.”

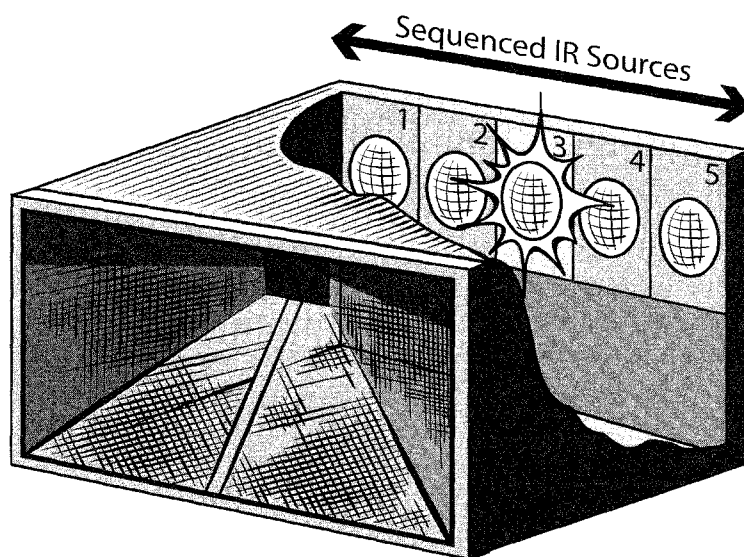
Functional claim language in the parent claim is often redundant in this way. Such language may serve as the very basis for patentability in the parent claim. It may not, however, be needed in order to distinguish the invention from the prior art once a dependent claim adds specific structural elements that carry out the recited function.

Claim 9.7 is an example of a claim with functional language that may become redundant once certain embodiment details are introduced in a dependent claim. This claim broadly defines an animal trap that lures the animal with an infrared or other electromagnetic energy source that simulates the movement of prey within the trap enclosure. The trap could be used to capture snakes, for example, many of which are able to detect the infrared (heat) energy given off by their prey. See Figure 9-1.

#### 9.7 An animal trap comprising:

an enclosure adapted to trap an animal that enters the enclosure, and  
an energy source that generates electromagnetic energy detectable by the animal, the energy being generated in a way that simulates the movement of prey for the animal within the enclosure.

The assumed prior art includes (a) a trap with a mechanically manipulated lure shaped like a mouse or other prey; and (b) an insect trap having a stationary, visible light source that blinks on and off. Claim 9.7 distinguishes over both because a mechanical lure does not generate elec-



**FIGURE 9-1** Snake trap with sequenced infrared sources simulating the movement of prey.

tromagnetic energy and a blinking light does not simulate the movement of prey.

Claim 9.7 does not limit the invention to the use of infrared energy, nor to any particular pattern that simulates the movement of prey. Those various embodiment details, rather, are pushed down into dependent claims 9.8 through 9.10.

9.8 The apparatus of claim 9.7 wherein the energy of said energy source is substantially all within the infrared spectrum.

9.9 The apparatus of claim 9.7 wherein said energy source comprises a plurality of individual energy sources that are activated and deactivated in such a way that at least one source is activated while at least one other source is deactivated.

9.10 The apparatus of claim 9.7 wherein said individual energy sources are arranged in a line and are activated in sequence along the line.

Now consider independent embodiment claim 9.11. The hook for patentability in this claim is its recitation that the lure comprises a plurality of individual energy sources that go on and off but not all at the same time. This language was lifted directly out of dependent claim 9.9 but, unlike the latter, independent embodiment claim 9.11 is not burdened by claim 9.7's movement-of-prey limitation.

**9.11 An animal trap comprising:**

an enclosure adapted to trap an animal that enters the enclosure, and  
a plurality of electromagnetic energy sources that are activated and  
deactivated in such a way that at least one source is activated while at  
least one other source is deactivated.

Claim 9.11 could prove to be quite valuable. The inventor may have *thought* that her trap worked as well as it did because the infrared pattern was simulating the movement of prey. But a competitor may discover that at least some heat-detecting animals are attracted to apparent changes in the position of the infrared source, whether or not those changes mimic the movement of any real-world creature. The competitor may thus produce a product where the on-and-off pattern is random, arguably avoiding the movement-of-prey limitation called for in claims 9.7 through 9.10. The competitor's random-pattern trap *would*, however, infringe independent embodiment claim 9.11 since that claim says nothing about the movement of prey.

### **Benefits in Licensing and Litigation**

The presence of independent embodiment claims in the issued patent provides benefits beyond their ability to define the invention more broadly than the dependent claims might.

In litigation, for example, judges and juries assessing the validity of a claim may not give separate consideration to the dependent claim limitations, even though they should. Once an independent claim has been found invalid based on prior art, its dependent claims are sometimes declared invalid as a matter of course, improper though that may be. Another possibility is that the limitations in the dependent claims *will* be looked at, but only in isolation, and will be deemed to add nothing nonobvious without the law of nonobviousness being properly brought to bear on the claim as a whole. All in all, then, a litigator's ability to make the case for infringement of an intermediate- or narrow-scope claim may be enhanced by being able to hand to the jury a claim that is self-contained.

Moreover, the dependent claim construct can be confusing to those who do not work with it day in and day out. As a result, jurors may mistakenly import limitations from one dependent claim into another. For example, the fact that claim 9.8 appears ahead of claim 9.9 in the claim family presented above might cause jurors to understand claim 9.9 to include claim 9.8's infrared energy limitation, even though claim 9.9 depends from claim 9.7. Here again, a different result may obtain if claim 9.9 were in independent form.

Additionally, the more independent claims (of all kinds) appearing in a patent, the more time and money a potential licensee or infringer will have to pay her attorney to (a) study the patent's claims and (b) render an infringement and/or validity opinion. The prospective high legal costs may perhaps drive up the minimum license fee that a potential infringer will find palatable.

### **Balancing Patentability and "Infringeability"**

By design, an independent embodiment claim backs off from our broadest view of the invention. The goal, per the philosophy of the Planned Retreat, is to give up a certain amount of claim coverage in exchange for establishing a more secure position of patentability should the broadest claims prove to have been too ambitious.

This is no time to get sloppy, however. The limitations that we include in our less than fully broad claims should still be chosen with care. If the patent's broadest claims prove to be invalid, the patent will be substantially valueless if the remaining claims have no chance of capturing at least some of the commercial marketplace. Yes, we are backing off from our broadest view of the invention. But we should not throw all caution to the wind and just write down whatever comes to mind. An effective independent embodiment claim is one that optimally balances the competing concerns of patentability and "infringeability."

Useful starting points for such claims are intermediate copies of claims and problem-solution statements that arose as the broad ones were being developed. While not achieving the ultimate in breadth, drafts of claims and problem-solution statements will have benefited from an analysis process that eliminated limitations that were deemed particularly unnecessary to the invention. A number of such less-than-fully-broad problem-solution statements appear in Appendix B's account of the author's "real time" thought processes when analyzing the invention of the backspace key.

Having taken a first cut at an independent embodiment claim, it is desirable to vet the claim to tweak up the patentability/infringeability balance. To this end, some of the prescriptions presented in Chapter Eight for keeping undue limitations out of inventive-departure-based claims can be thought about here as well. Most pertinent in this regard are

- Define, Don't Explain<sup>6</sup>
- Use Functional Recitations to Minimize the Number of Claim Elements<sup>7</sup>
- Scrutinize Every Modifier<sup>8</sup>

We would not necessarily apply all of these criteria to all of the claim's limitations; that might result in a claim that defines the invention

very broadly, which is not our goal. The point is to make a recitation-by-recitation judgment about where it makes sense to back off to arrive at a claim that has (a) an enhanced probability of distinguishing over the prior art, while (b) not being *so* specific as to be easily designed around. For example, we would probably still want to call for “means for fastening (or adhering)” rather than “a layer of slow-setting epoxy” in all but the intentionally narrowest of claims.

Every claim should be written with a goal in mind. It may be to capture the invention at its full breadth. Or, as here, the goal may be to draft a claim that includes important features of the embodiment(s) while not limiting the defined boundaries *too* much. A claim not expressly derived from the problem-solution statement will inevitably include one or more steps, elements, functions, or interrelationships that the problem-solution statement did not have. Being brought face-to-face with those differences enables the claim drafter to assess whether the claim achieves the intended goal.

Thus, per the philosophy of the Planned Retreat, we can consider each point of difference between our independent embodiment claim and the problem-solution statement and then ask ourselves whether the claim gives up more intellectual property than we had really intended.

### *Marketed Product Claims*

The author uses the term “marketed product claim” to refer to a particular type of independent embodiment claim that can achieve an advantageous balance between patentability and infringeability. A marketed product claim is a claim that includes those embodiment details that are most likely to appear in commercial products embodying the inventive concept. Input from the inventor and/or patent owner is, of course, invaluable in assessing which details those are. If the assessment is correct, it may be difficult for a competitor to design around the claim and still have a saleable product.

The patent owner’s own product, if any, can be a useful guide in this respect. The embodiment details implemented in the patent owner’s product represent at least the patent owner’s view of those features that are the most desirable to be included in a successful marketplace offering. Such features, then, are more likely than others to also appear in competitors’ versions of the product. Certainly a claim that lines up with the patent owner’s product will be of value if it is believed that competitors will make an exact knockoff or something very similar to the patent owner’s marketed product.

Recall the broad claim for the microwave oven turntable presented earlier,<sup>9</sup> directed to the idea of engendering relative motion between the

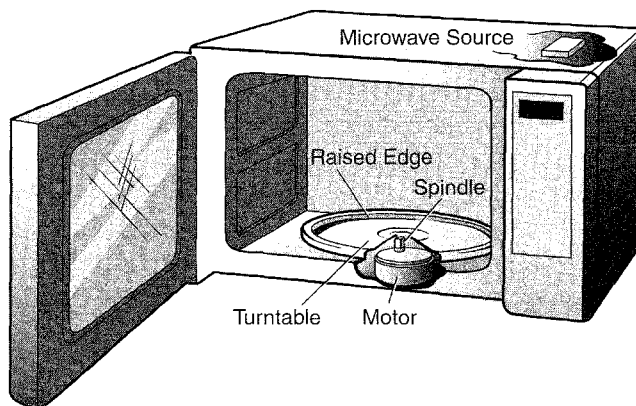


food in the microwave oven cavity and the microwave energy source as a way of solving the nonuniform food-heating problem. That claim is reproduced here as claim 9.12.

9.12 Apparatus for heating food in a microwave oven cavity, the apparatus comprising  
a microwave energy source, and  
means for engendering relative motion during the heating process between the food and the microwave energy source.

A marketed product claim for this invention is claim 9.13, which specifically calls for a turntable as the “means for engendering relative motion” and recites two features of the turntable. One feature is that the turntable has a raised edge, which keeps liquids from spilling onto the floor of the enclosure. Another feature is that the turntable is removably supported on a spindle, which allows the turntable to be readily removed from the microwave oven for, say, cleaning. See Figure 9-2.

9.13 A microwave oven comprising  
an oven enclosure,  
a microwave energy source,  
a spindle projecting from the floor of the enclosure,  
a motor for rotating said spindle when microwave energy from said source is being introduced into said enclosure, and



**FIGURE 9-2** Microwave oven turntable embodiment serving as the basis for a marketed product claim.

a turntable removably supported on said spindle in such a way that rotation of the spindle causes rotation of the turntable,  
the turntable having an edge that is sufficiently raised to keep liquids on the turntable from spilling onto the floor of the enclosure.

It is possible to market a microwave oven without those details. But the patent owner might well have been of the opinion that it would be difficult for a competitor to do without them and still sell many microwave ovens.

There are often differences between the patent owner's product and the competitor's version. Thus we do not want to go overboard in packing details into the product claim—particularly since many of those details may not enhance patentability in any event. Rather, we should pursue the goals of the Planned Retreat, undertaking to identify those aspects of the marketed product that are most likely to (a) show up in any commercially practical embodiment of the invention and (b) enhance the claim's patentability. Some set of the invention's fallback features will typically meet these dual requirements. If more than one set of fallback features seems advantageous in this regard, any number of marketed product claims can be drafted.

### *Picture Claims*

Another type of independent embodiment claim that may prove useful is the *picture claim*. This is a very narrow claim—heavy on structure, light on function, and, most significantly, heavy on the details of a particular disclosed embodiment. The basis for the designation “picture claim” may be that the claim presents a picture of the embodiment—albeit a picture “drawn” in words. Another explanation is that a picture claim is a detailed description of the “picture”—that is, the depiction of the embodiment(s) presented in the patent drawing.

A picture claim is more likely to be allowed than a claim of broader scope; the more limitations a claim has, the less likely it is for there to be prior art that meets them all. On the other hand, a picture claim is usually very easy for a competitor to design around by simply leaving out one of the claim's elements—usually not a difficult task when there are so many elements to choose from. So a picture claim is not likely to be infringed unless the product is a simple one, or unless there is reason to believe that a competitor will slavishly copy the patent owner's product.

On the other hand, by including a picture claim in the patent application, we increase the likelihood that a patent will issue; and just getting a patent, no matter what the breadth of its claims, is sometimes the patent owner's goal.

### Maximized Royalty Base Claims

Beyond their role in the Planned Retreat, claims of intermediate and narrow scope can add to the economic value of the patent.

Patent royalties and damages are based on the market value of whatever is encompassed by the claims, this being referred to as the “royalty base.” If the claimed invention is a new type of spring usable in ballpoint pens, but all the claims in the patent limit themselves to the spring itself, the royalty base will be the value of the infringing springs.<sup>10</sup> Obviously, the patent owner would rather have a royalty based on the entire value of the pens that include the new spring. The claim drafter would do well, then, to include at least one claim that recites the improved spring in combination with the pen in which it is intended to be used. A claim introduced into a patent application for this express purpose is referred to herein as a “maximized royalty base claim.”

There is no guarantee that a court will use the market value of the entire claimed combination when computing damages or lost profits. Common sense says that the owner of an altimeter patent is not going to be awarded royalties or damages based on the combined value of the altimeter and the jet liner in which it is installed, even if the patent includes a claim to that combination. Suffice it to say that whenever it can be plausibly argued that significant cooperation and interdependence exists, it can only help to include claims that define the inventive steps or elements in its likely commercial environment(s), thereby providing the patent owner with the opportunity to argue for the larger royalty base.

Maximized royalty base claims can be either in independent form or dependent form. The latter may prove awkward, however. For example, having started out with a claim directed to a spring, it may prove tricky to add a dependent claim having limitations directed to the pen in which the spring is used. Claiming the pen-spring combination in independent claim form avoids such difficulties.



Claims of intermediate and narrow scope protect and/or enhance the claim suite’s broadest claims in various ways. As we have just seen, these include implementing the Planned Retreat to account for new cited prior art disclosing the inventive concept; maximizing the issued patent’s royalty base; and possibly setting the stage for a claim-differentiation argument.

There are at least two other contingencies that claims also need to be protected against. One is that a claim may read on prior art that does *not* disclose the inventive concept. Another contingency is that a claim may

be deemed indefinite. Those contingencies are addressed with so-called definition claims—the subject of the next chapter.

### Notes

1. See pp. 54–55.
2. See pp. 58–59.
3. See Chapter Ten, pp. 115–121.
4. *Beachcombers, International, Inc. v. WildeWood Creative Products, Inc.*, 31 F.3d 1154, 1161, 31 USPQ2d 1653, 1659 (Fed. Cir. 1994).
5. *Multiform Desiccants, Inc. v. Medzam, Ltd.*, 133 F.3d 1473, 1480, 45 USPQ2d 1429, 1434 (Fed. Cir. 1998).
6. See p. 91.
7. See p. 94.
8. See p. 95.
9. See p. 71.
10. Under the right circumstances, pursuant to the so-called entire market value rule, the royalty base may be deemed to extend beyond that which is encompassed by the claims. See, *e.g.*, *Bose Corp. v. JBL, Inc.*, 274 F.3d 1354, 61 USPQ2d 1216 (Fed. Cir. 2001); and *Fonar Corp. v. General Electric Co.*, 107 F.3d 1543, 41 USPQ2d 1801 (Fed. Cir. 1997).

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## CHAPTER TEN

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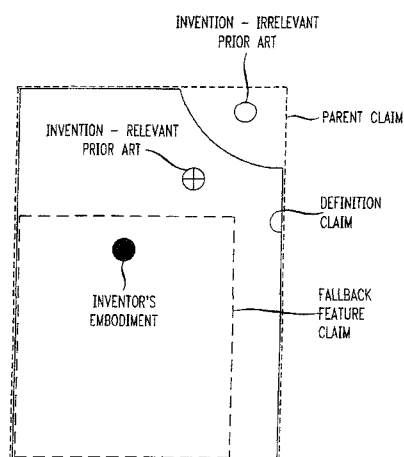
### Definition Claims

A fallback feature claim stakes out a more limited parcel of intellectual property than its parent. As we saw in the previous chapter, the contingency being guarded against is that prior art teaching of the subject matter intended to be captured by the parent claim may surface after the patent application is filed, rendering the parent claim unpatentable or invalid. A fallback feature claim intentionally retreats from the boundaries defined by its parent claim to a narrower but possibly more patentably secure position, as depicted in Figure 10-1. The author refers to such prior art as “invention-relevant” prior art because not only does the parent claim read on it, but the prior art actually discloses what the inventor thought *she* had invented.

This chapter discusses another important type of claim, referred to as a definition claim. Like fallback feature claims, definition claims are typically in dependent form. Unlike fallback feature claims, however, definition claims are not intended to retreat from what the inventor regarded as her invention. Rather, a definition claim defines more specifically the invention boundaries that were intended all along, as also depicted in Figure 10-1. A definition claim thereby addresses two types of potential deficiencies in the parent claim not addressed by fallback feature claims.

One of the potential deficiencies addressed by a definition claim is that the parent claim may read on prior art that does not disclose the inventive concept. The author refers to such prior art as “invention-irrelevant” prior art. The other potential deficiency is that the parent claim may be indefinite under 35 U.S.C. 112, ¶ 1 because either the parent claim itself or a claim that the parent claim depends from contains indefinite terminology.

Almost anything added to a claim narrows it to a greater or lesser degree. A definition claim thus narrows the subject matter called for in its parent. But in contrast to a fallback feature claim, the subject matter that a definition claim “gives up” is not anything we ever regarded as part of the invention.



**FIGURE 10-1 Fallback feature claims and definition claims address different kinds of prior art.**

### Parent Claim Potentially Reads on Invention-Irrelevant Prior Art

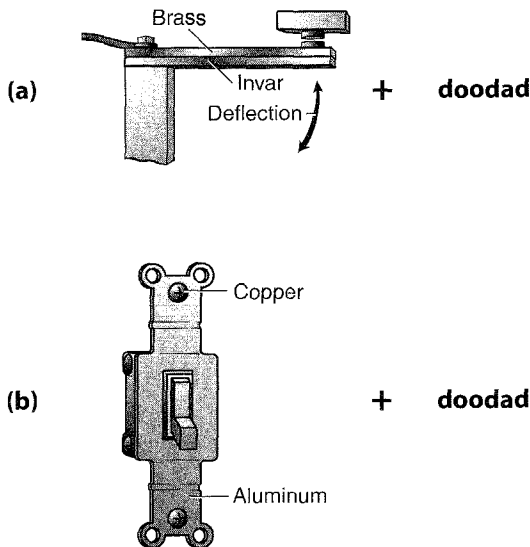
We first explain the use of a definition claim to anticipate the possibility that a parent claim may read on invention-irrelevant prior art, that is, prior art that does not disclose the inventive concept. Claim 10.1 is such a claim, reciting the combination of a bimetallic switch with a doodad.

10.1 Apparatus comprising  
a bimetallic switch, and  
a doodad connected to the bimetallic switch.

In this claim, the term “bimetallic switch” is intended to refer to a known type of electrical switch made up of two strips of metal having different coefficients of expansion, such as the alloys brass and invar. Such a switch will bend in response to changes in temperature and is widely used in thermostats. The inventor has discovered that adding a doodad to such a switch improves its sensitivity to temperature changes.

To see how a definition claim functions differently from a fallback feature claim, let us first consider how a fallback feature claim might function for this invention.

Figure 10-2a posits the existence of prior art teaching what the inventor thought that *she* was the first to come up with—a two-strip switch that bends with temperature changes, connected with a doodad. There is no hope for a claim as broad as claim 10.1 in this situation. Patentability will have to be predicated on a fallback position defined by a fallback



**FIGURE 10-2** Two pieces of prior art, each disclosing a “bimetallic switch” in combination with a doodad.

feature claim. Claim 10.2 is such a claim, calling for the (assumedly inventive) addition of a “gizmo” to the subject matter of claim 10.1.

10.2 The apparatus of claim 10.1 further comprising  
a gizmo connected to the doodad.

By contrast, Figure 10-2b posits the existence of certain invention-irrelevant prior art that claim 10.1 also reads on. The dictionary defines “bimetallic” as “consisting of two metals.” Therefore, *any* switch made from two kinds of metal is a “bimetallic switch,” broadly speaking. Figure 10-2b shows such a wall switch—made of copper and aluminum—combined with a doodad. This prior art also anticipates claim 10.1.

Unlike the first case, however, the wall-switch prior art does not anticipate the inventive concept. Indeed, the inventor never intended her claim to encompass the wall-switch arrangement, which doesn’t exhibit the problem she set out to solve and certainly does not solve it.

Establishing a position of patentability in *this* situation does *not* require falling back to a more limited parcel of intellectual property, such as the subject matter defined by “gizmo” claim 10.2. The boundaries defined by claim 10.1 are *just fine* if only the term “bimetallic switch” is firmed up to say what was meant by that term all along. There is no need to retreat from the intended claim boundaries—just to clarify them.

Claim 10.3 is a definition claim that addresses this situation, defining the term “bimetallic switch” in the sense that the inventor always intended, thereby excluding the wall-switch prior art.

10.3 The invention of claim 10.1 wherein the bimetallic switch comprises at least a pair of substantially overlapping metal strips having different coefficients of expansion.

Claim 10.3 is not a fallback feature claim, because it does not retreat from the intended boundaries of the parent claim 10.1. It simply makes clearer what those boundaries were always intended to be.

### Parent Claim Is Potentially Indefinite

Let us now consider the second function of definition claims—anticipating the possibility that the parent claim may be indefinite. This is a violation of § 112's requirement of claiming the invention "distinctly." A claim is indefinite if the public cannot determine with reasonable certainty what the boundaries of the claimed subject matter are.<sup>1</sup> The so-called notice function of a patent's claims means that potential infringers have to be able to determine whether their actual or contemplated products will be covered by the claim or not.<sup>2</sup> The definiteness requirement is no mere formality. A claim that is indefinite is invalid.<sup>3</sup>

Examples of potentially indefinite terms are the italicized words in the following recitations: *high-resolution* filter, *intelligent* processor; *vigorous* agitation; *quick* and *ready* access; *acceptable* level of pliability. After all, how much resolution is *high* resolution? When is a processor *intelligent*? How vigorous is *vigorous* agitation? What level of pliability is *acceptable*?

Recitations like these often seem perfectly fine to the claim drafter. He knows what he means. Or least he thinks he does. But the examiner (and later, the Opposing Team) may assert that such terms are indefinite.

Claim 10.4 is an example of a potentially indefinite claim making reference to the "complexity" of an algorithm:

10.4 The invention of claim 1 wherein the complexity of the first algorithm is much less than the complexity of the second algorithm.

How does one assess the complexity of an algorithm? It is the number of steps or branch points? The level of the sophistication of its underlying mathematics? The time required to execute it? And what level of complexity would satisfy the claim's "much less" recitation? Absent an explicit definition in the specification, e.g.,

as used in this specification and in the claims, the complexity of an algorithm is measured by the time required for its execution



these are unanswerable questions, which is what probably makes this claim indefinite.

Yet another example of a potentially indefinite term is the word “elongated” in chair claim 6.1, reproduced here as claim 10.5.

10.5 Apparatus comprising

a seat, and

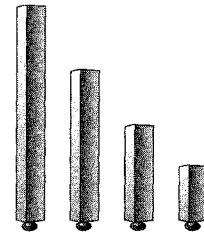
means for supporting the seat above an underlying surface,

the means for supporting including one or more elongated support members.

What minimum length-to-thickness ratio makes a chair leg elongated? As a chair leg gets shorter and shorter, it becomes increasingly unclear as to whether it is “elongated” or not. See Figure 10-3.

Claim 10.6 is a definition claim that addresses the potential indefiniteness of claim 10.5. It defines “elongated” to mean having a length-to-thickness ratio of at least 3 to 1.

10.6 The invention of claim 10.5 wherein each support member has a length-to-thickness ratio of at least 3 to 1.



**FIGURE 10-3**  
When is a chair leg “elongated”?

That definition of “elongated” should, of course, also appear in the specification as being at least the preferred minimum length-to-thickness ratio.

It is not crucial to distinguish between terminology that may be indefinite (“elongated”) and terminology that might cause a claim to read on invention-irrelevant prior art (“bimetallic”). We simply need to focus on each word or phrase in a claim and consider whether either situation may obtain. The two questions to be asked are

1. Might this terminology encompass more than what we intend?
2. Could it be argued that the terminology is so indefinite that the public cannot discern the boundaries of the claimed subject matter?

If the answer to either question is yes, serious consideration should be given to drafting a definition claim that backstops the terminology in question.

## Questions and Answers

*Since a definition claim defines what we meant all along, why not put the definition into the parent claim at the outset and not bother with a separate definition claim?*

There is always a danger that a definition will be more restrictive than we might have contemplated, thereby giving up claim coverage that we didn't intend to give up. The wall-switch prior art shown in Figure 10-2b may not actually exist, in which case independent claim 10.1 would be patentable. Keeping the broad term "bimetallic switch" in independent claim 10.1 and establishing a backup position by defining that term in definition claim 10.3 covers both contingencies.

*Virtually any word or phrase has the potential to be interpreted in an unanticipated way. Isn't it impractical to backstop every term with a definition claim?*

Yes, it is impractical. The key is to identify terms that intuition and experience say are more likely to need backstopping than others. Terms that are the most crucial for patentability should get particular attention. Patentability of claims 10.1 and 10.5 hinges solely on the terms "bimetallic" and "elongated," respectively. Definition claims that explicitly define those terms are definitely called for.

*Rather than including definition claims in the application when first filed, why not wait to see what prior art the examiner has found and then amend the pending claims to define a term during prosecution if this proves necessary?*

Amending a claim during prosecution may not be possible if the definition to be relied on is not at least implicit in the specification as filed. Focusing at the outset on the possibility that we may need to rely on a definition claim sometime after the application is filed ensures that appropriate definitions are included in the specification in the first instance.

Moreover, the issue may not come up during prosecution, but only afterward—during a licensing negotiation or a litigation—when it is too late to amend the claims. Once a claim is in litigation, the court is supposed to interpret it narrowly in light of the specification if doing so will save it from invalidity based on prior art.<sup>4</sup> However, the more narrowly interpreted claim may no longer capture the accused product. Win the battle (the claim

is valid) and lose the war (the claim is not infringed). Moreover, amending a claim element during prosecution may prevent doctrine-of-equivalents treatment for that element.<sup>5</sup>



This chapter and the previous chapter make clear the crucial role served by claims that are often written in dependent form—notably fall-back feature claims and definition claims. But so far, we’ve mostly talked about these claims in isolation. They must be somehow assembled into claim families, with each dependent claim of the family being dependent from either the family’s independent claim or another one of the dependent claims. The number of combinations and permutations is usually too large to include them all. A principled approach to assembling the dependent claims is our next topic.

### Notes

1. See, *e.g.*, *In re Borkowski*, 422 F.2d 904, 164 USPQ 642 (CCPA 1970).
2. See, *e.g.*, *Personalized Media Communications, LLC v. Int’l Trade Comm’n*, 161 F.3d 696, 705, 48 USPQ2d 1880, 1888 (Fed. Cir. 1998).
3. See, *e.g.*, *Intellectual Prop. Dev. Inc. v. UA-Columbia Cablevision*, 336 F.3d 1308, 67 USPQ2d 1385, 1392 (Fed. Cir. 2003); *Intel Corp. v. VIA Tech., Inc.*, 319 F.3d 1357, 65 USPQ2d 1934 (Fed. Cir. 2003).
4. See, *e.g.*, *Modine Mfg. Co. v. United States Int’l Trade Comm’n*, 75 F.3d 1545, 37 USPQ2d 1609 (Fed. Cir. 1996).
5. *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 62 USPQ2d 1705 (2002).



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## CHAPTER ELEVEN

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### Assembling the Dependent Claims

A claim, be it in independent or dependent form, may recite any number of features, each worthy of a fallback feature claim.<sup>1</sup> It may also include any number of terms, each worthy of being backstopped by a definition claim.<sup>2</sup>

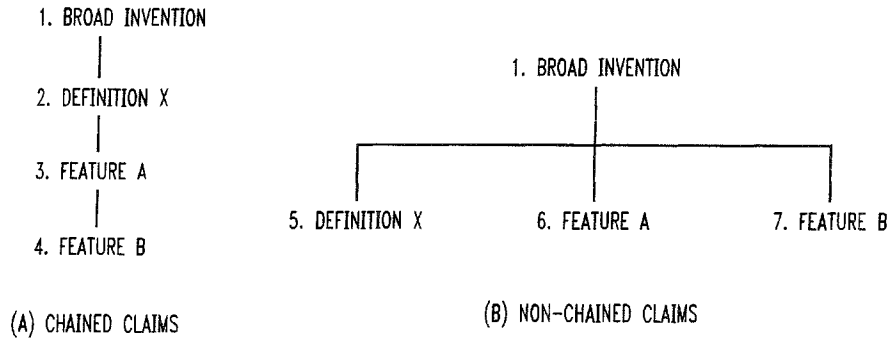
How are all these claims to be arranged? They could all be made to depend as peers from the parent claim. Or they could be strung out in a chain, each claim depending from the next. Mix-and-match combinations of these are also possible. The number of claims required to cover all the possibilities is usually prohibitive, however, and so choices need to be made. This chapter presents guidelines for making those choices and, in so doing, implementing a successful Planned Retreat for the invention.

#### The Chaining Dilemma

Figure 11-1(A) depicts a claim family comprising claims 1–4. The broad invention is claimed in independent claim 1. A terminology definition X is recited in dependent claim 2. Fallback features A and B are recited in claims 3 and 4, respectively.<sup>3</sup> This is referred to as a claim chain because the claims are linked one to the next. Claim 4 depends from claim 3, which depends from claim 2, which depends from claim 1.

Figure 11-1(B) depicts a claim family in which the same dependent claims are arranged as peers in a non-chained arrangement. Claims 5, 6, and 7 are identical to claims 2, 3, and 4, respectively, except that claims 5, 6, and 7 all depend from claim 1 instead of being dependent from one another.

The non-chained approach of Figure 11-1(B) maximizes the possibility that a competitor's product will infringe at least one valid claim of the claim family. If claim 1 proves to be invalid, infringement occurs as long as the competitor's product includes any *one* of the limitations X, A, and B in conjunction with the limitations of claim 1. For example, claim 6 is infringed as long as the competitor's product includes fallback feature A in conjunction with the limitations of claim 1. If the product also meets limitations X or B, then that many more claims are infringed.



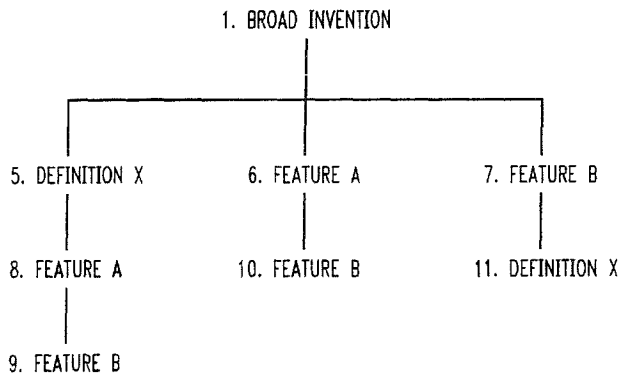
**FIGURE 11-1** Dependent claims can be chained or non-chained.

The chained approach of Figure 11-1(A), by contrast, does *not* maximize the possibility that a competitor's product will infringe at least one valid claim of the family. A competitor's product that does not meet terminology definition X will not infringe any of the dependent claims, even if that product includes features A or B, because claims 2, 3, and 4 each incorporate terminology definition X. If claim 1 were to be invalid in *this* situation, this family would contain *no* claim that is both valid and infringed.

The chained approach does have an advantage, however. It provides more robust protection against unforeseen prior art or indefiniteness. Claim 4, for example, encompasses not only its own limitations but those of claims 1 through 3 as well. With the non-chained approach of Figure 11-1b, by contrast, none of the dependent claims benefits from the potentially enhanced patentability afforded by the others.

If the total number of fallback features and terminology definitions is small, we can cover all bases with a reasonably small number of claims. In that case, the "chain-or-not-chain" (aka the "wide-or-deep") problem goes away. For example, Figure 11-2 shows that only seven dependent claims are required to cover all ways of combining any one or more of limitations X, A, and B with the limitations of claim 1.

The number of possible combinations doubles for each additional claim, however. Accommodating all the combinations of four, five, or six fallback feature claims and/or definition claims within a single claim family could require as many as 15, 31, and 63 dependent claims, respectively, although the actual number would probably be smaller since some limitations make sense only when tied in to others. Moreover, it is usually desirable for the overall claim suite to include multiple claim families in order to (a) define the broad invention in more than one way,<sup>4</sup> (b) present the invention in various settings,<sup>5</sup> and (c) employ various statu-



**FIGURE 11-2 Seven dependent claims cover all possible combinations of three limitations with an independent claim.**

tory claim types.<sup>6</sup> The potential number of claims could thus become quite large. And since the Patent and Trademark Office assesses a fee for each claim beyond a certain number, the filing fees could quickly mount up.

The expense may be justified if the invention is important enough. In the typical case, however, judicious choices need to be made to keep the claim count to a reasonable number. Those choices should be made based primarily on the goals of the Planned Retreat. If retreat to narrower claims becomes necessary, those claims should give up as little valuable intellectual property as possible while establishing a defensible position for what's left. A claim that does not further the Planned Retreat goals or serve some other purpose—such as reciting a terminology definition or serving as a maximized royalty-based claim—is probably superfluous.

Inherent in the Planned Retreat philosophy are two competing considerations: Any word added to a claim has the potential to contract its scope and create an infringement loophole. But that very same contraction in scope may be needed to establish a position of patentability if claims that are broader are found to read on the prior art.

Those competing considerations are effectively balanced by following the guidelines discussed in the sections below.

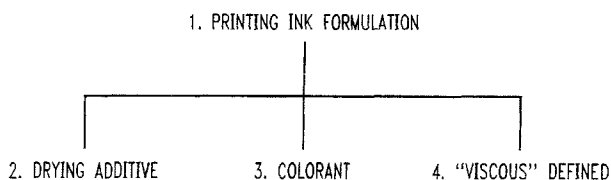
- Claims independently imparting patentability to an (independent or dependent) parent claim should be non-chained relative to one another;
- Claims imparting patentability to a parent claim in combination should be chained with one another;
- Claims not imparting patentability to a parent claim in combination should not be chained with one another;
- Claims serving no function should be avoided altogether;
- Claims should be positioned within the claim family hierarchy based on their contribution to the planned retreat.

### Claims Independently Imparting Patentability Should Be Non-Chained

Each significant fallback feature should be recited in a dependent claim that depends directly from the parent claim being backed up.

In the example of Figure 11-3, parent (in this case, independent) claim 1 is directed to a printing-ink formulation believed to be novel and nonobvious. There are two fallback features—an additive that promotes quick drying of the ink and a unique blue colorant (pigment). Both the additive and the colorant are believed to be inventive in combination with the basic printing-ink formulation recited in claim 1. Each of those features thus provides an effective position of retreat should the broad ink formulation turn out to be in the prior art. The non-chained approach is appropriate here because a potential infringer might use the quick-drying additive without the colorant, or vice versa. Thus, as shown in Figure 11-3, claims 2 and 3 directed to these features each depend directly from the parent claim 1. Claims 2 and 3 are each defensible positions of retreat. We would therefore not want to chain these features only by, for example, making claim 3 dependent from claim 2. To do so would be to give up potentially valuable intellectual property unnecessarily.

Similar considerations apply to definition claim 4. Claim 1 might recite, for example, that the printing ink is “viscous.” The term is potentially indefinite. The printing-ink industry does distinguish between printing inks that are relatively resistant to flow at one extreme and those that are relatively less resistant to flow at the other—the latter presumably being the “viscous” ones. But how could one know whether any particular ink between those two viscosity extremes is or is not “viscous?” Definition claim 4 puts some boundaries on the term “viscous” by defining it as a particular viscosity range, for example, “between 300 and 400 centipoises.” By depending directly from claim 1, definition claim 4 pro-



**FIGURE 11-3** Claims reciting features independently enhancing patentability of the broad invention should each depend directly from the independent claim, as should any claims defining terminology in that claim.

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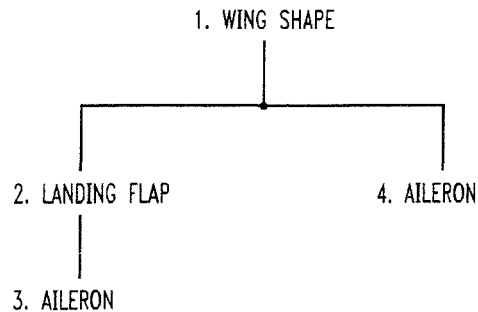
tests the broad subject matter of claim 1 from possible invalidity based on indefiniteness.

Of course, a claim defining “viscous” could also be chained with claims 2 and/or 3 in order to also protect *those* claims from the possible indefiniteness of the term “viscous” inherited from their parent claim 1. The desirability of such mixing and matching is discussed below.

### Claims Imparting Patentability in Combination Should Be Chained

Claims reciting features that would not be obvious to combine with each other and the parent claim subject matter should be chained. Such claims should also be presented in non-chained form if they appear to be independently novel and nonobvious.

This is the situation depicted in Figure 11-4 for a family of claims directed to the airplane wing of Figure 11-5. The inventor of this wing has discovered that the particular



**FIGURE 11-4** Claims reciting features that impart patentability in combination should be chained.

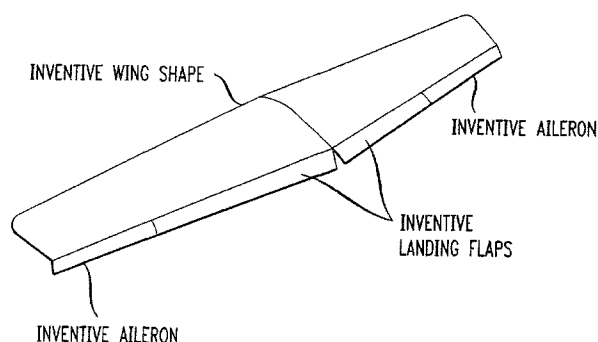
aileron and landing flap configurations that she used in her prototype synergistically affect the wing’s flying characteristics in a nonobvious way, providing an argument for the nonobviousness of the combination of the aileron and the landing flap with the broad wing shape.<sup>7</sup> Claim 3 of this claim family combines all three elements.

The inventor also believes that the aileron and landing flap configurations independently enhance the patentability of the basic wing shape. As a result, those features are set forth in respective fallback feature claims 2 and 4, each depending directly from independent claim 1.

Although claims 3 and 4 are both directed to the aileron feature, each serves a useful function for this invention’s Planned Retreat. Aileron claim 4 gives up less intellectual property real estate than aileron claim 3 does. Claim 3, on the other hand, establishes a potentially more secure position of retreat because we have an argument as to the nonobviousness of combining the aileron and the landing flap with the broad wing shape.

### Claims Not Imparting Patentability in Combination Should Not Be Chained

When no synergistic result or other indicium of nonobviousness arises from the combination of particular features, chaining them is not going to achieve much from a patentability standpoint. We should *separately* claim each feature in combination with the parent claim and be done with it. If the effect of the aileron on the performance of the wing of Figure 11-5 is the same no matter what landing flap is used (and vice versa), then claim 3 is superfluous from the Planned Retreat point of view.



**FIGURE 11-5** Wing with an inventive shape having two fallback features—an inventive type of aileron and an inventive type of landing flap.

Specifically, if the wing-shape-plus-aileron combination were not known or obvious, then we could always retreat to aileron claim 4. Claim 3 would be superfluous because claim 4 would be a better position to retreat to, given that claim 3 also requires the wing to have the recited landing flap. Claim 3 is also superfluous if, on the other hand, the wing-shape-plus-aileron combination *were* known or obvious because under the facts assumed above, the patentability of the wing-shape-plus-landing-flap-combination recited in claim 2 would not be enhanced by adding the aileron to the combination.

### Claims Serving No Function Should Be Avoided Altogether

A claim that serves no function in a claim family should not be included in the patent application. This statement may seem self-evident, but it needs to be said. In practice, patent applications routinely include claims that serve no useful function whatsoever.

Consider, for example, claims 11.1 and 11.2 directed to a bottle cap.

## 11.1 A bottle cap comprising

- (a) ...
- (b) ..., and
- (c) ...

wherein said cap includes an array of parallel ribs on the side of the cap and parallel to its central axis.

## 11.2 The bottle cap of claim 11.1 wherein there are 122 of said ribs.

The recitation in dependent claim 11.2 that the bottle cap has exactly 122 ribs is not a defensible position of retreat. Ribbed bottle caps are in the prior art, and the exact number of ribs is a matter of design choice. Therefore, any number of ribs—including 122—is obvious, assuming no “unexpected results” derive from having exactly 122 ribs. If the parent claim 11.1 proves to be unpatentable or invalid based on prior art, claim 11.2 will fall right along with it. Moreover, such a claim constricts the claimed subject matter to such a small realm as to have virtually no value. It is easy enough for others to manufacture a cap with some other number of ribs. We can see, then, that claim 11.2 achieves neither goal of the Planned Retreat—it gives up a lot and is not a defensible place to fall back to in any event.

Similarly, the patentability of a ballpoint pen invention is not enhanced by a dependent claim reciting that the ink is black. It is obvious that the ink in any ballpoint pen can be black. Such a claim, then, is not a defensible position of retreat; if the parent claim falls, its black ink dependent claim falls right along with it.

Indeed, the black ink claim can be downright harmful if other claims depending from it *do* serve some function but do not appear elsewhere in the overall claim suite without being burdened by the ink-is-black limitation. Consider the claim family in Figure 11-6. If prior art makes it necessary to retreat from the basic ink formulation recited in claim 1, it will be necessary to retreat down through black-ink dependent claim 2 to inventive quick-drying additive claim 3. Claim 3 stakes out a defensible position of retreat but that position is limited, for no good reason, to inks that are black.

An old saw has it that “when a dog bites a man, that’s not news,” which is to say that there is nothing new in what is ordinary or expected. By analogy, it is not “news” when

- 1. BASIC INK FORMULATION
- |
- 2. INK IS BLACK
- |
- 3. INVENTIVE DRYING ADDITIVE

**FIGURE 11-6**  
**Claim 3 is**  
**limited to black**  
**ink for no good**  
**reason.**

- ... said ink is black;
- ... said computer is a laptop;
- ... said form of payment is a debit card; or
- ... said window has a fixed sash.

Claims of this type are almost always superfluous.

### **Position Claims Within the Claim Family Hierarchy Based on Their Contribution to the Planned Retreat**

The preceding guidelines use the philosophy of the Planned Retreat to help us decide whether or not claims should be chained relative to one another. We still need to decide, however, where a given claim or sub-chain ought to appear within the overall claim family hierarchy.

Here again the philosophy of the Planned Retreat is our guide.

A claim should appear relatively high up in the claim family when the claim's subject matter (a) is likely to show up in others' embodiments and (b) seems likely to add patentability based on prior art and/or definiteness concerns. The stronger those likelihoods, the higher in the claim family the claim ought to appear. Conversely, a claim should appear in a relatively low position in the claim family when it meets only one or neither of these criteria.

Here is the guideline in bullet form:

1. Position a claim relatively high in the claim family hierarchy based on the extent to which
  - the subject matter of the claim is believed likely to be incorporated in practical commercial embodiments;
  - the subject matter of the claim is believed likely to support patentability;
  - a term defined by the claim is seen as being vulnerable to attack as being indefinite; and/or
  - a term defined by the claim is seen as potentially excluding invention-irrelevant prior art that may show up downstream.
2. Position a claim relatively low in the claim family hierarchy based on the extent to which the above criteria are not met.

A useful way of implementing this approach is to stop at each point in the process of assembling a claim family and ask, *What is the next most important thing to say?* It might be a particular fallback feature, or it might be a particular terminology definition. Whatever that next most important thing to say happens to be, it is the next claim to be added to the claim family in process.

To illustrate that approach, let's revisit the example of the chair.<sup>8</sup> Recall our postulate that the broad invention is the notion of a seating device having "one or more elongated support members" or "legs." Four worthwhile fallback features were also identified, these being that the legs were

1. four in number,
2. attached at the seat periphery,
3. attached to the corners of a rectangular seat, and/or
4. perpendicular to the seat.

A claim family based on Planned Retreat principles was then assembled, but without taking into account the possible need for any definition claims—a topic that had not, to that point, been introduced in the book. Indeed, we saw later on that a definition claim to backstop the term "elongated" would be desirable to address the possibility that "elongated" might be deemed indefinite.<sup>9</sup>

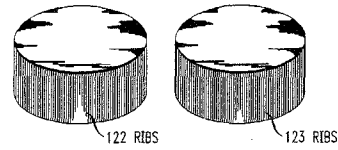
Let us see, then, how the paradigm of asking *What is the next most important thing to say?* can be used to arrive at a family of claims for the chair invention, taking into account both its fallback features and the need to define the term "elongated."

As shown in Figure 11-8, we start with claim 1 defining the broad invention of elongated support members, or "legs."

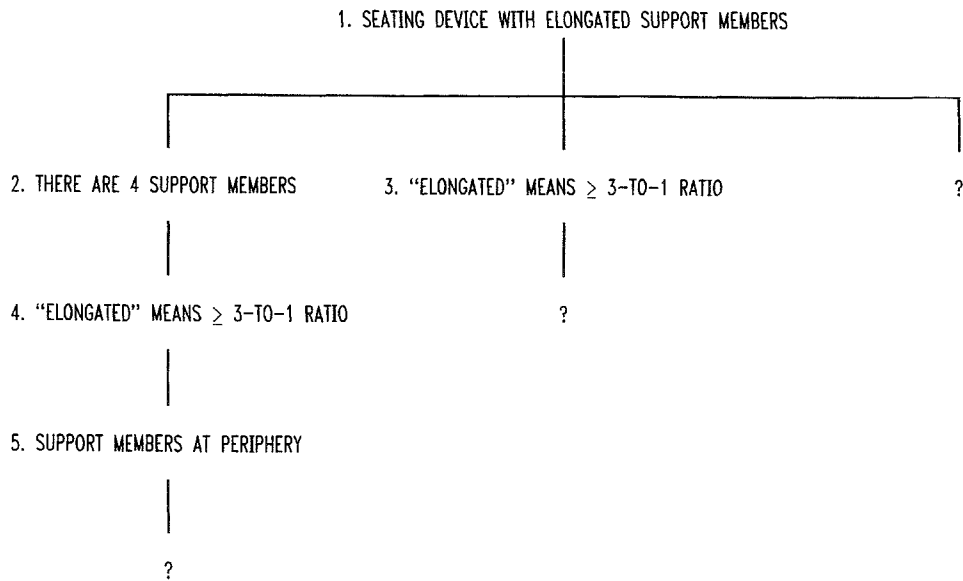
What is the next most important thing to say?

Based on what the inventor has told us<sup>10</sup> and given the goals of the Planned Retreat, it turns out that, after saying that the support members (legs) are elongated, the next most important thing to say is that there are exactly four of them. The inventor's experiments demonstrated that four legs was advantageous from a number of standpoints, leading him to conclude that competitors were also likely to implement the four-leg feature in *their* chairs. Thus being forced to retreat to a four-legs claim would still provide coverage for a great deal of commercially valuable subject matter.

Moreover, on the patentability front, the inventor noted that the obvious number of legs to have was not four, but three. This provides an argument that the prior art "taught away" from four legs, making it a nonobvious, and therefore patentable, option. The other features of the elongated support member were seen as more likely to be deemed obvious, or in fact actually known, were it to eventuate that the broad elongated-support-member idea is taught in the prior art.



**FIGURE 11-7 Absent unexpected results, a dependent claim reciting that a bottle cap has a particular number of ribs serves no useful function and can readily be done away with.**



**FIGURE 11-8** A mix-and-match approach may be required to cover the important combinations of limitations.

The conclusion, then, is that the four-legs feature best meets the Planned Retreat’s dual criteria of giving up as little intellectual property as possible while establishing a defensible position for what’s left. It is clearly the next most important thing to say—at least on the fallback feature front. As shown in Figure 11-8, the four-legs feature is recited in claim 2 directly dependent from independent claim 1.

What is the *next* most important thing to say?

A strong candidate is to define the term “elongated.” We have already observed that the term “elongated” is potentially indefinite and could cause claim 1 to be declared invalid. For reasons discussed earlier, we don’t want to put a definition of elongated directly into claim 1. Yet we would hate to lose the broad invention to indefiniteness or to invention-irrelevant prior art in which the support members were deemed to be “elongated” even though they were just a tiny bit longer than wide. Defining what might be meant by “elongated”—for example, a length-to-thickness ratio of at least 3 to 1—is thus certainly at least as important as the four-leg fallback position. Indeed, in some sense it might be seen as even more important since it protects broad claim 1 without retreating much, if at all, from the broad idea of elongated support members in any practical sense. As shown in Figure 11-8, our definition of “elongated” is presented in claim 3—a claim that, like claim 2, depends directly from independent claim 1.

What is the next most important thing to say?

We observe that claim 2 is susceptible to being declared indefinite in that it inherits the undefined term “elongated” from claim 1. The four-leg fallback feature is so valuable to the overall Planned Retreat strategy that we would hate to lose it simply because the term “elongated” was deemed indefinite or caused the claim to read on invention-irrelevant prior art. The next most important thing to say, then, is probably that those four elongated support members are not merely “elongated” but, indeed, have the 3-to-1 ratio. Figure 11-8 shows the inclusion of a definition claim 4 that is identical to claim 3 but depends from claim 2.

What is the next most important thing to say?

The further down we go into the claim family hierarchy, the less clear-cut the answers become. The analysis in Chapter Six concluded that at least certain of the fallback features were worthy of fallback feature claims directly dependent from claim 1, represented by a “?” in Figure 11-8. The Chapter Six analysis also concluded that certain combinations of the fallback features established particularly defensible positions of retreat because of the nonobvious advantages that arose from those combinations. For example, the inventor had discovered that putting the four support members at the periphery provided a particularly stable seating device. So at least one of the next most important things to say is that the four support members are attached at the seat periphery. Figure 11-8 includes a claim 5, directed to this feature and dependent from claim 4.

But is the four-legs-at-the-periphery combination sufficiently important that it should be recited *without* introducing a (possibly unduly limiting) definition of “elongated”? That is, should we introduce a claim like claim 5 but dependent directly from claim 2?

How about chaining further fallback features onto claim 3 and/or claim 5?

Some possible answers, at least on the fallback feature front, are reflected in the full claim family presented in Chapter Six. But the choices reflected in that particular claim family are judgment calls to a large extent. Intuition and experience in assessing what may happen in prosecution very much come into play, as does, of course, the practical consideration of excess claims fees.

This is an appropriate point to break off from this example, while observing that each case is *sui generis*. Fallback features and terminology definitions can appear in many different chained and unchained combinations within a given claim family, each possible arrangement offering a unique combination of patentability and “infringeability.” A fallback feature claim may recite a feature that competitors are likely to include in their products, but the claim may nonetheless not be infringed if there is any limitation further up the chain that the competitors’ products do *not*

include. On the other hand, patentability of the claim in question may hinge on that very same limitation.

A mix-and-match approach guided by the philosophy of the Planned Retreat is thus usually where we will end up.

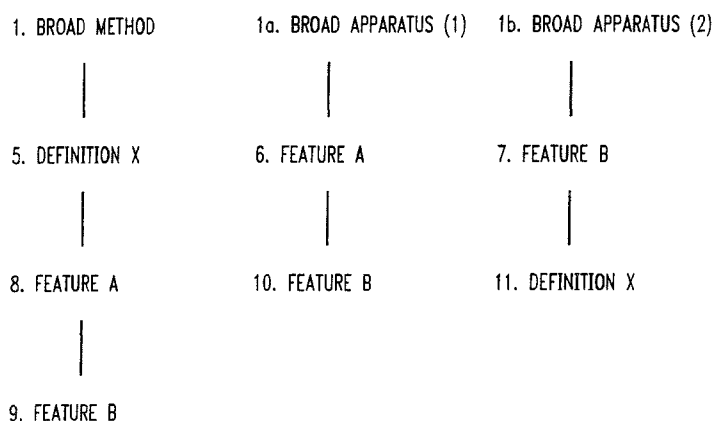
### **Manage Claim Counts by Using Dependent Claim Combinations in Different Claim Families**

The above guidelines can help us eliminate unnecessary claims and thereby help keep the claim count down. The total number of claims we wind up with can still be undue, however, if all of the worthwhile dependent claim combinations were to be included in every claim family.

If desired, the claim count can be reduced further by putting different combinations of dependent claims into different claim families, albeit with some risk as discussed below.

Consider, for example, the three claim chains appended to broad independent claim 1 in Figure 11-2, based on the non-chained structure of Figure 11-1(B). Replicating these chains for each other independent claim might result in an undesirably large claim total for the application. Figure 11-9 shows how those three chains could be divided among three different claim families, one headed by an independent method claim and two headed by independent apparatus claims.

There is some risk in this approach. If the combination of the broad invention with feature A turns out to be in the prior art, only claims 7, 9, 10, and 11 will remain valid. Our ability to assert a method claim against infringers may then be compromised in that claim 9—the only surviving



**FIGURE 11-9** Claim counts can be managed by dividing different combinations of dependent claims among various claim families.



method claim—incorporates definition X and Feature A. These are limitations that competitors' methods may not meet. Apparatus claim 7 is free of those limitations, but the anticipated enforcement scenario may be such that a method claim is easier to enforce.<sup>11</sup>

These are the kinds of contingencies that caused us to include all possible combinations of limitations for the single independent claim in Figure 11-9. If the invention is important enough, it may be in the patent owner's best interest to incur the excess claims fees rather than risk the loss of claims that may prove vital.

### **Markush Groups—A Trap for the Unwary**

Some practitioners keep the claim total down by using Markush groups. That practice, however, is a trap for the unwary.

A Markush group is a listing within a claim of a group of alternatives. Its original use was in the context of composition of matter inventions in which no generic term was available to encompass a group of alternative constituents within the composition.<sup>12</sup> Markush groups are now used for all types of inventions, as in claim 11.4 below reciting that the processor-based device of claim 11.3 "is a selected one of a i) computer, ii) personal digital assistant and iii) cellular telephone."

11.3 A method for use in a processor-based device, the method comprising . . .

11.4 The method of claim 11.3 wherein said processor-based device is a selected one of a (i) computer, (ii) personal digital assistant, and (iii) cellular telephone.

By combining the three choices into one claim, the claim drafter has incorporated into one dependent claim what would otherwise require three.

Claim 11.4 is presumably intended to provide a fallback position if the subject matter of parent claim 11.3 is invalid based on prior art. However, if it is known (or obvious) to carry out claim 11.3's method in even one of the three devices—for example, the computer—claim 11.4 is also invalid because it reads on the case where the computer is the "selected one." This is true even if it were not known or obvious to carry out the method in a personal digital assistant or a cellular telephone. We see, then, that the presence of the "computer" in the Markush group ruins claim 11.4 as a fallback vehicle. The longer the list, the worse it is, since it is increasingly likely that the claim will read on some piece of prior art.

The better practice is to identify those alternatives that could provide an effective fallback position and recite each one in its own dependent claim.

One possible *effective* use of a Markush group in a non-composition of matter context is in a definition claim, either to protect against indefiniteness or unpatentability based on invention-irrelevant prior art. When a Markush group is included in a dependent claim for *those* reasons, we don't care that the claim does not enhance patentability of its parent, because it is serving a different purpose.

Consider, for example, claims 11.5 and 11.6. The parent claim 11.5 calls for "a network edge device" in a packet network (e.g., the Internet). Such a device is understood in art to mean a router, bridge, or other network switching element at the point where signals enter the packet network. Hence the term "network edge" device. Claim 11.6 includes a Markush group specifically defining the network edge device as being either a router or a bridge.

11.5 A packet network comprising

- (a) a network edge device,
- (b) . . . and
- (c) . . .

11.6 The invention of claim 11.5 wherein said network edge device is one of (a) a router and (b) a bridge.

Claim 11.6 will not save its parent claim from invalidity based on invention-relevant prior art. If the broad inventive concept turns out to be known, it would necessarily use a router, a bridge, or some obvious equivalent at the network edge. Claims 11.5 and 11.6 stand or fall together in the face of such invention-relevant prior art.

However, claim 11.6 *can* save its parent from invalidity based on invention-irrelevant prior art. Claim 11.5 might read on prior art in which the "network edge device" is not a router, a bridge, or anything like them but, rather, a simple screw terminal to which incoming telecommunications lines are connected. Such a terminal is, after all, a "network edge device" broadly speaking. Claim 11.6 firms up the invention boundaries that were always intended, thereby securing coverage for the inventive concept while avoiding such invention-irrelevant prior art.



This brings us to the end of Part II. We have identified the invention and its fallback features. And we have seen how to draft claims directed to these. But it is not enough to draft claims in isolation. The patent application's overall claim suite needs to be developed in a way that maximizes the value of the issued patent to the patent owner. That is the subject of Part III, which follows.

### Notes

1. See Chapter Six, pp. 53–64.
2. See Chapter Ten, pp. 115–121.
3. A particular claim may recite more than one fallback feature or terminology definition. For simplicity this discussion assumes that is not the case.
4. See p. 173.
5. See pp. 143–151.
6. See Chapter Thirteen, pp. 165–172.
7. *Merck & Co., Inc. v. Biocraft Laboratories, Inc.*, 874 F.2d 804, 10 USPQ2d 1843 at 808 (Fed. Cir. 1989).
8. See p. 56.
9. See p. 119.
10. See pp. 59–60.
11. See p. 166.
12. See, *e.g.*, *MANUAL OF PATENT EXAMINING PROCEDURE*, § 2173.05(h) (8th ed., rev. 2, May 2004).



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P A R T   I I I

*The Claim Suite and the Anticipated  
Enforcement Scenario*



## Introduction to Part III: The Claim Suite and the Anticipated Enforcement Scenario

Drafting claims that will be allowed by the patent examiner is only a part of the patent attorney's job. Another is anticipating what will happen when the patent owner goes to enforce the claims—referred to here as the “anticipated enforcement scenario.”

PART III—*The Claim Suite and the Anticipated Enforcement Scenario*—describes how to assemble a suite of claims that maximizes the value of the patent to the patent owner and that minimizes the possibility of something going wrong at enforcement time.

CHAPTER TWELVE introduces the idea of invention settings. An invention setting is a particular environment or context in which the invention is manifest. For example, two settings for a lock invention could be the lock itself and a key appropriate to operate the lock. It is desirable to claim an invention in all of its commercially significant settings in order to maximize a patent's value when it comes time to enforce it. Chapter Twelve also introduces the idea of the “single reachable party.” Enforcement of a claim can be difficult or impossible unless all of its limitations are carried out by (a) a single party who is (b) subject to the jurisdiction of the U.S. legal system (assuming a U.S. patent).

CHAPTER THIRTEEN emphasizes the importance of claiming an invention using all appropriate statutory claim types. Consider a patent claiming machinery that implements a novel manufacturing step. Machines on a factory floor, especially their innards, are not easily inspected by outsiders. It may be difficult to prove, therefore, that the competitor's machine meets each recited element of an apparatus claim. However, it may be clear from the vended product that the novel step was used, making it desirable to have method claims and claims directed to the product. A statutory class is not the same thing as an invention setting. For example, a given invention can be claimed in multiple settings using the same statutory claim type, such as the lock and key mentioned above. An invention can also be claimed within a single setting using more than one statutory claim type. In addition, having claims in the right statutory class may be crucial to the patent's realizing its full economic potential. For example, a percentage royalty based on a claim

directed to manufacturing machinery may be only a tiny fraction of the royalty that would be generated by a method or apparatus claim covering the machinery's throughput.

CHAPTER FOURTEEN focuses on claim diversity. This means defining the invention—even within a given statutory class—by using different claim formats, applying different terminology, or presenting claim elements in a different order. This is often referred to as claiming the invention from different “angles.” Diversity in the overall claim suite addresses the possibility that any one claim may contain an unappreciated infringement loophole. Drafting both problem-solution-based and inventive-departure-based claims as described in Chapters Six and Seven, for example, provides a measure of diversity to the claim suite.

CHAPTER FIFTEEN summarizes all the considerations that should be brought to a review of the claim suite with the anticipated enforcement scenario in mind.



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## CHAPTER TWELVE

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### Invention Settings and Direct Infringers

A patent owner may not realize the full value of her patent unless the invention is claimed in all of its commercially significant settings.

An invention setting—also called a “claim perspective” or “claim point-of-view”—is an environment or context in which the inventive concept is manifest. We will see how a cylinder lock invention, for example, can be manifest in at least three different settings—the lock itself, the key, and the key-cutting machine. An invention setting is “commercially significant” when it is expected that competitors will implement the invention in that particular setting.

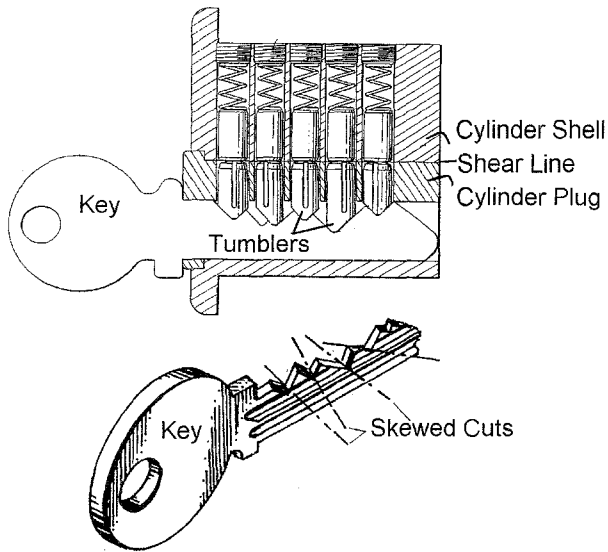
Realizing the full value of a patent also requires that the claims will capture the activities of (a) an individual—as opposed to co-acting—parties who (b) would be direct infringers if unlicensed. That goal is largely achieved, as it turns out, when the claims define the invention strictly within the boundaries of its various settings. Drafting and reviewing claims with individual direct infringers specifically in mind helps ensure that the claims will capture the activities of those parties.

This chapter discusses patent value principally in terms of license royalties or monetary damages. The ideas in this chapter, however, apply with equal force when a patent is to be cross-licensed or when the patent owner intends to exercise her right of exclusivity. In any of these cases, the patent owner’s goals may be less than fully realized if the claims define the invention in less than all of its commercially significant settings and/or do not capture the activities of individual direct infringers.

Two exercises presented at the end of the chapter—one involving a clothing manufacturing process and the other a web server network—give the reader opportunity to analyze claims with the ideas of the chapter in mind.

#### **Invention Settings**

In this section we explore the notion of an invention’s commercially important settings and see why a patent’s value depends on claiming the invention in all of them.



**FIGURE 12-1** Invention with multiple settings

### Invention Settings Explained

The cylinder lock invention presented in Figure 12-1 illustrates an invention with multiple settings.

As in cylinder locks generally, the cylinder plug of this lock can rotate within the cylinder shell only if the key raises the top of each tumbler to the shear line. Doing that in this particular lock requires that the key not only raise the tumbler by a particular amount, as in the prior art, but that the key also *rotates* the tumbler by some amount. The rotation is caused by key cuts that are skewed rather than perpendicular to the plane of the key. Not only are the lock and key unique, but the key must be cut on a unique key-cutting machine.

The novelty in each of these components stems from a single inventive concept—the fact that the tumblers are rotated. Yet the lock, the key, and the key-making machine represent three different settings in which the inventive concept is manifest. The key blank might be a fourth setting if it has some feature that distinguishes it from prior art key blanks.

As another example, two settings for a paper-making invention could be (a) the composition of the paper and (b) the manufacturing of the paper.

An invention setting is not the same as a statutory class. The latter is an invention category—a process, machine, manufacture, or composition of matter.<sup>1</sup> An invention setting, by contrast, is an environment or context in which the inventive concept is manifest. In our lock example, the contexts are the lock itself, the key, and the key-cutting machine.

Indeed, an invention can often be defined in a given setting using more than one statutory claim type. For example, the lock invention could be defined within the key-cutting machine setting by apparatus claims defining the structure of the machine as well as by method claims defining how the machine operates to cut the key. In the paper-manufacturing setting, the invention could be claimed both as a method for making the paper and as an apparatus (paper-making machine) that carries out that method.

Nor is an invention setting the same as an invention embodiment. The embodiments of an invention differ in the details of how the invention is implemented. Our paper composition could include synthetic fibers in one embodiment and natural fibers in another. But either embodiment might be claimed in either of the two settings noted above.

Many, if not most, inventions have multiple settings, as in the following further examples:

- (a) Chemical compound useful as a pharmaceutical; (b) making the compound; (c) treating a medical condition using the compound
- (a) Encoding a video signal (to reduce the amount of data required to represent it); (b) decoding the encoded signal
- (a) Plastic container; (b) preform useful in producing the container; (c) producing the container from the preform
- (a) Roadway base intermediate; (b) roadway base containing the intermediate; (c) roadway made of the roadway base that contains the intermediate
- (a) Peptide; (b) cell capable of producing the peptide; (c) manufacturing the peptide

### **The Importance of Invention Settings**

As noted at the outset, the patent owner may not realize the full value of his patent unless the invention is claimed in all of its commercially significant settings. We might think to claim the lock and be done with it; however, others might only cut keys or might only make the key-cutting machine, thus not infringing the lock claim and not being liable to the patent owner.

Claiming an invention in all of its commercially significant settings is particularly important when the royalty base in one setting is significantly larger than in another. One would certainly think to claim a television signal format invention in the setting in which the signal is generated—the broadcast transmitter. However, there are only about 20,000 television stations worldwide, and their owners do not buy new transmitters very

often. By contrast, more than 150 million television *sets* and more than 45 million set-top boxes are sold worldwide every year. That's more than 3 billion television sets and set-top boxes over the 15–18 years of a patent's enforceable lifetime. The patent owner would certainly not be content to collect royalties on only 20,000 transmitters when, with a properly drafted claim, he could collect royalties on 3 billion television sets and set-top boxes.

It is, in fact, possible to claim such an invention in a receiving-end (e.g., television set, set-top box, decoding chip) setting even though the circuitry required to decode the signal might be obvious given a knowledge of the signal format.

Claim 12.1 is such a claim, in which the inventive concept is the notion of frequency-interleaving the chrominance (color) and luminance (black-and-white) information of a color video signal.<sup>2</sup>

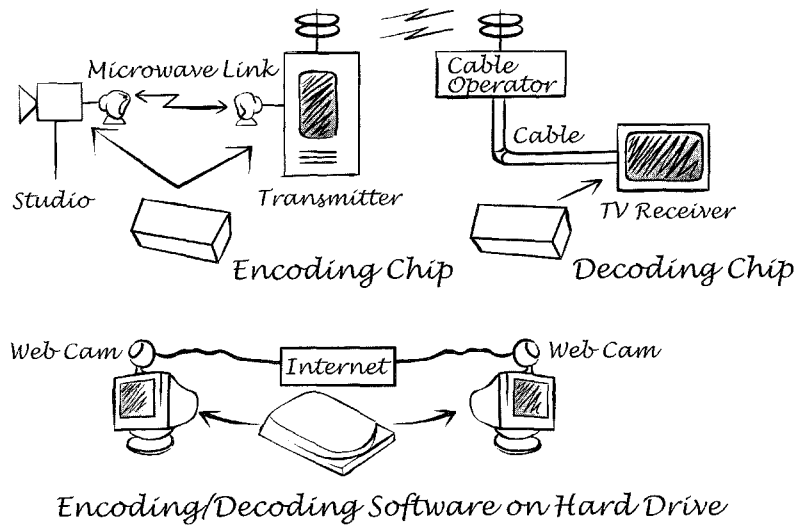
#### 12.1 Apparatus comprising

- (a) means adapted to receive color video signals having interleaved chrominance and luminance information contained with said video signals, and
- (b) means for recovering the luminance and chrominance information from the received video signals.

A helpful technique for identifying an invention's settings is to make a sketch—perhaps a block diagram, flowchart, functional representation, or pictorial drawing—that can bring to our attention the various contexts in which the invention may be manifest.

Figure 12-2 is a sketch for a video compression invention, which involves both encoding the video signal and, at some point thereafter, decoding the encoded signal. Sketching out the figure helps us to realize that the settings for this invention include

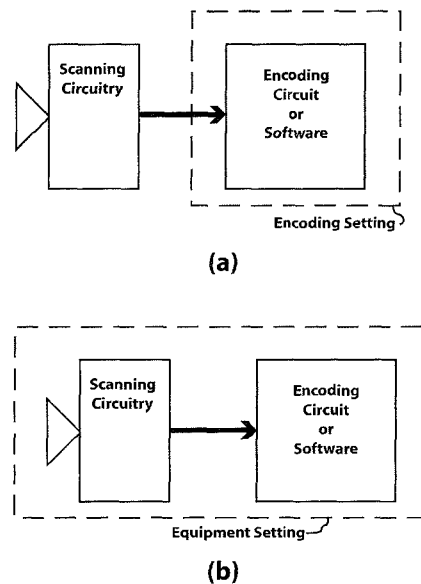
- Encoding and decoding settings—that is, the encoding and decoding algorithms per se may be carried out by integrated circuits vended by an integrated circuit manufacturer or by software on the hard drive of a computer;
- Equipment encoding and equipment decoding settings—that is, video equipment including studio cameras, web cams, broadcast transmitters/receivers, and personal computers, all of which may include the above-mentioned encoding and/or decoding integrated circuit(s) or the software; and
- Transmission setting—that is, transmission media over which the encoded signals might travel, including studio-to-transmitter micro-



**FIGURE 12-2** Making a sketch is a useful way of identifying an invention's settings

wave links, coaxial cables, and the facilities of Internet service providers.

Claiming the invention in all of its commercially significant settings ensures that we will have claims that capture the activities of all classes of parties against whom the patent owner may want to assert the issued patent. A claim that defines the invention in the encoding setting, as in Figure 12-3a, will capture the activities of integrated circuit manufacturers and importers. A claim that, as in Figure 12-3b, defines the invention in the equipment encoding setting—this by virtue of its including steps or components that are outside of the encoding algorithm per se—will capture the activities of video equipment manufacturers and importers.



**FIGURE 12-3** Two settings for a video encoding invention.

Competitors' equipment is also affected by an encoding setting claim since the algorithm is performed within the equipment. An advantage of the equipment claim, however, is its larger royalty base.<sup>3</sup> So the patent owner's licensing strategy might be to license the equipment manufacturers instead of the integrated circuit manufacturers.<sup>4</sup>

A possible disadvantage of a licensing strategy that focuses on the equipment manufacturers is the need to license each equipment manufacturer individually. There may be too many of them to make this practical. The patent holder's strategy might therefore be to negotiate for royalties from, or attempt to secure injunctions against, the relatively few integrated circuit manufacturers rather than attempting to enforce the patent against innumerable equipment manufacturers further down the supply chain.

On the other hand, equipment may implement the algorithms in software, such as software bundled with a personal computer's operating system. The value of that fraction of the operating system software that carries out the video encoding and decoding may be quite small indeed, making it difficult to argue for significant royalties.

The patent owner may therefore want to adopt a dual-pronged strategy, charging royalties from integrated circuit manufacturers for integrated circuits that implement the invention, and charging royalties from equipment manufacturers for equipment that implements the invention in software.

There is no need for any of this to be decided at the time of filing. Indeed, the patent owner's enforcement strategy could change over time. Having claims directed to the invention in all of its commercially significant settings keeps all the options open.

One of the author's colleagues makes it a practice to identify all of the commercially important invention settings before beginning any claim drafting. He then proceeds methodically through the identified settings, drafting claims for each one.

I spend a lot of time thinking through the invention settings before I even get into the guts of a first draft of a claim. Understanding the larger picture of protecting the invention from these different settings allows me to automatically exclude a range of meaningless limitations that might be improperly suggested by a poorly-analyzed picture claim. For example, trying to get a claim to the structure of a key will inevitably get me thinking about what parts of the key-cutting machine are just not relevant and meaningful to the exclusionary grant I am crafting when I am drafting key-cutting-machine claims.

Only after I have a map in my mind of the settings of all of the independent claims do I move on to fleshing out the guts of each claim.

—BSL

### Maintaining the Integrity of the Invention Setting Boundary

Having decided to claim the invention in a particular setting, we must take care to restrict the claim to that setting. If something outside the boundary of the setting makes its way into the claim, parties whose activities would otherwise infringe the claim may no longer do so.

Consider, for example, claim 12.2, which is intended to define a video compression invention in its encoding (e.g., integrated circuit) setting, as depicted in Figure 12-3a.

12.2 A method comprising  
generating a video signal to be encoded, and  
encoding the video signal by . .

(a) . . .

(b) . . .

(c) . . .

Unfortunately, the step of “generating a video signal to be encoded” is outside of the intended setting; encoding circuitry or software does not generate the video signal, but receives it from somewhere else. This is a point that integrated circuit manufacturers will lose no time in pointing out when the patent owner approaches them to take a license. And while it would be fairly easy to make out a case of contributory infringement or inducement in this situation, those are suboptimal enforcement strategies, as discussed below.

Including the step of “generating a video signal” in a claim intended to define the invention in the encoding setting is an easy trap to fall into. After all, the “workstuff” of the algorithm is the video signal, and it does have to be generated by *something*. True, but that doesn’t mean that the video signal has to be generated *in the claim*. Rather, input signals can usually be simply assumed to exist, as though handed to us by a genie; there is no need to explicitly generate an input signal in a claim.<sup>5</sup> In this particular case we can simply eliminate claim 12.2’s offending “generating”

step and change the encoding step to that of “encoding *a* video signal,” per claim 12.3:

12.3 A method comprising

encoding a video signal by . . .

(a) . . .

(b) . . .

(c) . . .

As another example, consider claim 12.4, whose intended setting is a piece of apparatus intended for use in a packet transmission network, such as the Internet. The problematic recitation is a control unit “connected to” a packet transmission network.

12.4 Apparatus comprising

(a) a control unit *connected to* a packet transmission network and configured to monitor traffic on the network,

(b) . . .

(c) . . .

This claim goes outside the boundary of the apparatus setting. It requires that the apparatus actually be connected to the network. The claim does not read on the apparatus as sold by the manufacturer, but only after the network owner connects the apparatus to its network. This problem is remedied in claim 12.5.

12.5 Apparatus comprising

(a) a control unit configured to monitor traffic on a packet transmission network,

(b) . . .

(c) . . .

Our goal should be to draft claims that will read on a competitor’s product as it sits on the competitor’s shipping dock. This might even be thought of as the “shipping dock setting.”



Thinking about the advertising disclaimer “batteries not included” is another helpful way of analyzing whether a claim violates a given invention setting boundary. What “batteries” might the Opposing Team not include with their product as shipped?

### **The Individual Direct Infringer**

The invention should be claimed in a way that will capture the activities of individual direct infringers.

Direct infringement of a patent occurs when someone, without authority, makes, uses, offers to sell, sells, or imports something that meets all the limitations of at least one of the patent’s claims.<sup>6</sup>

There are other ways in which someone can be liable under a patent, such as by inducing someone else to infringe<sup>7</sup> or by being a contributory infringer,<sup>8</sup> these being forms of so-called indirect infringement. However, contributory infringement and inducement require proof that some party is a direct infringer.<sup>9</sup> Without a direct infringer, there can be no contributory infringer. Nor can there be an inducer of infringement. So a case of direct infringement will have to be proved in any event. Moreover, indirect infringement involves additional proof elements. For example, contributory infringement requires proof that the part of the invention supplied by the accused party constitutes a “material part” of the invention and also requires that the accused party knew of the patent and knew that the part was especially made or especially adapted for use in an infringement of the patent.<sup>10</sup>

Going further, the invention should be claimed in a way that will capture the activities of *individual* direct infringers. Multiple parties can be liable as joint direct infringers, such as where Party A carries out the initial steps of a claimed manufacturing method to produce an intermediate product that is completed by Party B carrying out the remaining claimed steps.<sup>11</sup> However, the mere fact that parties can be found whose combined activities meet all the claim limitations does not necessarily establish them as joint infringers. The case law invokes such concepts as “privity” and “control” and “working in concert” when assessing the relationship that will establish multiple parties as joint direct infringers.<sup>12</sup> Those kinds of connections between the parties are often not there.

Even if those connections *are* there, joint infringement may not exist if a claim encompasses the activities of parties in different countries. For example, the apparatus claims of a U.S. patent are directly infringed only if all of the claimed assembled or unassembled apparatus is made, used, offered for sale, sold, or imported within the United States.<sup>13</sup>

And even if joint infringement *could* be made out in a given case, this is not something we want to have to do. More facts will have to be

proved; more parties will have to be deposed; more attorneys will be involved; and so forth.

Moreover, since we have full control over the claims when the patent application is being drafted, there is no excuse for not claiming the invention in a way that will capture the activities of individual direct infringers if there is any way to do it. The idea that “we can always get them for contributory or inducement” or that “we can always just sue them jointly” is not a valid reason to pass up the opportunity to draft claims that will be directly infringed by individual parties when we can do so.

Claiming the invention in all of its commercially significant settings usually takes us most, if not all, of the way there. For example, claiming our video encoding invention in its coding/decoding setting, per claim 12.3 and Figure 12-2a, ought to make for a pretty airtight case against individual integrated circuit manufacturers or vendors of encoding/decoding software. However, we may have missed a setting altogether. Drafting and reviewing claims with the individual direct infringer in mind helps assure that all bases are covered.

### Two Frequent “Offenders”

Try as we might to draft claims that individuals will directly infringe, the Opposing Team may outsmart us—figuring out some way we did not anticipate to divide the claim steps or apparatus elements among multiple parties. We will see an example of that below.

At the very least, however, we can avoid claiming the invention in ways where multiple-party action is likely, if not guaranteed.

One typical frequent offender is the so-called system claim. Claim 12.6 is such a claim, directed to a telecommunications network comprising two telephone central offices and interoffice circuits interconnecting them.

12.6 A telecommunications network comprising

- (a) an originating central office,
- (b) a terminating central office,
- (c) one or more interoffice circuits interconnecting the originating and terminating central offices, and
- (d) ...

The difficulty is that the two central offices may belong to two different local telephone companies and the interoffice circuits may include the

facilities of yet a third party, such as a long-distance carrier. Under those facts no single party would infringe this claim. And if the parties do not work in sufficiently close concert that they might be deemed joint infringers, that avenue of enforcement would be foreclosed as well.

By comparison, claim 12.7 defines the same invention in the central office setting rather than the system setting. As such, it limits infringement to a single party—the manufacturer of the central office—and reads on the product as it sits on the manufacturer’s shipping dock without the apparatus having to be “up and running” or connected into a network as claim 12.6 requires.

12.7 A central office adapted for use in a telecommunications network, the central office comprising

(a) means for connecting the central office to another central office in the network via one or more interoffice circuits, and

(b) ...

Claim 12.7 offers another advantage over claim 12.6. Even if a single party owned and operated all of the elements called for in claim 12.6, that single party would most likely be a telephone company. The patent owner is likely a manufacturer of telecommunications equipment. In theory, the patent owner could assert the patent against telephone companies that buy infringing equipment from competing manufacturers. Asserting a patent against your own customers is not a good way to engender good will and future sales, however. Claim 12.7 enables the patent owner to avoid that situation since it can be asserted against competing manufacturers directly. Indeed, forcing competitors to pay a royalty increases the competitors’ costs and may enable the patent owner to offer her own equipment at a lower price.

Another frequent offender is the consumer action claim. This is a claim that invokes action on the part of a consumer or other private party in what is, in essence, a commercial activity. The claimed subject matter in claim 12.8, for example, is a method in which a computer user selects a displayed icon, causing a signal indicating the selected icon to be transmitted to a web server. The web server, in turn, processes that signal in some novel way. The claim comprises two steps (a and b) performed by the computer user and two steps (c and d) performed by the web server.

12.8 A method comprising

(a) selecting an icon displayed on a screen,

- (b) transmitting to a web server a signal indicative of the selected icon,
- (c) receiving the signal at the web server,
- (d) processing the received signal in such a way that. . .

A computer user and a web server operator are certainly not likely to be found to be in privity or working in concert, and certainly neither controls the other. As such, they are unlikely to be adjudged joint direct infringers.

As in the system claim case, there is a ready fix: draft a claim strictly limited to the web server setting. Claim 12.9 is such a claim. It calls for the web server to receive and then process the signal generated by the computer user without affirmatively reciting any user-performed steps.

#### 12.9 A method comprising

- (a) receiving a signal indicative of a user-selected screen-displayed icon
- (b) processing the received signal in such a way that. . .

Even if a patent were to contain only multiparty claims, the patent owner would not be without some recourse. The Opposing Team's assertion that "we don't do everything called for in the claim" can be responded to by suggesting that the Opposing Team's customers might be liable as joint or contributory direct infringers. Those options may have little legal merit, but the specter of customers being joined in a patent suit may nonetheless bring the target infringer to heel. No businessman wants his business relationships strained in that way. But the ploy may not work. The accused party may call the patent owner's bluff, forcing her to then bring an action that stands a good chance of failing in the final analysis.

There is no way around it. No opportunity should be missed to claim the invention in a way that captures the activities of individual direct infringers.

### Take On an Opposing Team Mind-set

The Opposing Team readily finds infringement loopholes because they are *motivated* to find those loopholes and, indeed, to exploit them. By taking on an Opposing Team mind-set, we can find those loopholes just as easily and close them while the claims are still being drafted. Putting ourselves into an Opposing Team mind-set, then, is a good way to verify

that (a) the invention has been claimed in all of its commercially significant settings, and (b) the claims will capture the activities of individual direct infringers to the maximum extent possible.

A colleague of the author puts himself into an Opposing Team mindset by imagining that the claim is under attack. He thinks in terms of both what he calls easy attacks and subtle attacks.

An “easy” attack occurs when the Opposing Team finds a way to implement the inventor’s teachings while avoiding one or more limitations in the claim. A subtle attack occurs when the Opposing Team creates a business model in which even if all the limitations of a claim are met, there is no individual direct infringer.

Security experts often speak of analyzing “attacks” in a cryptographic sense and their practical viability in a real world setting. I think of claims similarly. There are the easy “attacks,” such as a competitor relying on limitations that clearly do not need to be reflected in the broadest abstraction that is the independent claim. For example, a product claim that includes a “magnetizable sleeve” as an element could possibly be avoided by introducing a sleeve that is not “magnetizable.” That would be an “easy” attack on a claim. Thwarting such an attack is simply a matter of reading closely.

Then there are the more subtle “attacks” that are often overlooked—such as a competitor creating a business model that does not require the practice of certain steps or the construction/use/sale of certain components that are required by a claim.

An example of a more “subtle” attack would be considering alternative business models that avoid the territorial effects of a U.S. patent or that separate the components/activities of a product/service claim in a way that can avoid contributory infringement issues. If a service claim requires steps A, B, and C, consider whether steps B and C can be performed in Cameroon (especially problematic for a lot of Internet-related patents). If a product requires components A, B, and C, consider a business arrangement where you only sell parts A and B and require customers to obtain a licensed version of C.

—BSL

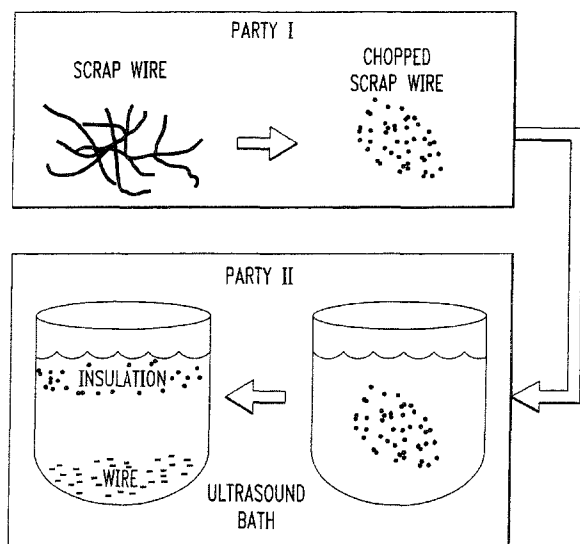
As an example of such a subtle-attack business model, consider the discovery that the insulation on scrap wire can be removed from the metal by chopping the wire into very fine pieces and agitating the pieces in an ultrasound bath. The insulation will float and the bare metal will sink to the bottom of the bath, from which it can be readily recovered and recycled.

Claim 12.10 recites the process in two steps: chopping the wire and agitating the chopped pieces in an ultrasound bath to separate the insulation from the metal.

12.10 A method comprising,  
chopping insulation-covered metal wire into pieces that are no longer than the width of the insulation, and  
agitating the chopped pieces in an ultrasound bath,  
whereby the insulation and the metal separate in the bath.

Figure 12-4 shows how this can easily be made a multiparty activity in which Party I does the chopping and Party II does the agitating and recovery of the bare wire. Even if the parties have a close connection, there is no infringement in this country if the Opposing Team sets up their business in such a way that the scrap wire is chopped in Canada and then shipped into New York State for agitation/separation. Or Party II may choose to buy already-chopped wire from an unrelated Party I, who sells chopped wire on the open market for some other use, such as a filler of some kind or for recycling in a process not based on ultrasound removal of the insulation.<sup>14</sup>

Rather than relying on the law or the facts to fall our way, we would do better to turn this into a process that one individual will infringe. Claim 12.11 encompasses the actions of Party II exclusively.



**FIGURE 12-4** An invention that the Opposing Team might divide into a multiparty process in the hopes of avoiding infringement.

12.11 A method comprising,  
agitating, in an ultrasound bath, pieces of insulation-covered metal wire  
that are no longer than the width of the insulation,  
whereby the insulation and the metal separate in the bath.

Other analytical approaches might also have brought us to claim 12.11. It may have occurred to us when analyzing the invention's settings that the ultrasound bath is a setting in and of itself. Or we might have recognized the chopped wire as being an input to a process that simply involves agitation and, as such, is not required to be generated within the claim, just as a video signal can be treated as an input to an encoding process and, as such, not required to be generated within a claim to the encoding process per se. Or we could have recognized that because the chopped wire is an intermediate product in claim 12.10, further distillation of the claim is possible.<sup>15</sup>

None of the pitfalls discussed in this section are difficult for the alert claim drafter to avoid. The key is simply to recognize that we get a patent not because the patent owner wants to do something, but because someone else may want to do it. Taking on an Opposing Team mind-set will enable us to quickly appreciate all the things someone else might do that take advantage of the invention and to assure ourselves that our claim suite will encompass all the ways that an individual party might carry them out.

### Exercises for the Reader

The claims in the following two examples violate various precepts set forth in this chapter. They also contain unnecessary elements and other unduly narrowing limitations not necessary to distinguish the invention from the prior art.

The reader is invited to take on the role of the Opposing Team's patent attorney and figure out all the ways in which non-infringement can be argued and/or how the Opposing Team's business model could be arranged so as to ensure non-infringement.

Each example is followed by the author's analysis and a suggested improved claim.

#### Example I: Clothing Manufacture

##### *Invention*

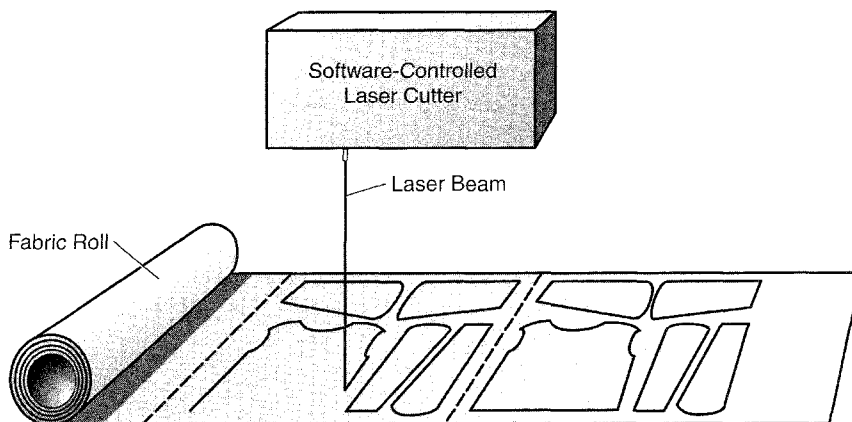
The typical prior art clothing manufacturing process for making a shirt, for example, cuts through a stack of fabric to produce a large number of shirt fronts, then shirt backs, then sleeves, collars, and so on. One of each

component of the shirt is then taken from a respective stack so that the garment can be sewn together. The inventive departure is a process for small-scale manufacturing of garments. As depicted in Figure 12-5, all the pieces of the article of clothing are cut from a particular section of a single ply of textile. As a result, all the pieces for an individual garment are together when they come off the cutting machine and thus in a “kit” ready to be sewn.

### *Claim*

A method for mass producing clothing, the method comprising

- (a) creating a set of software instructions for a computerized cutting machine, the instructions defining the shapes of a set of pieces of fabric to be cut for an article of clothing to be produced,
- (b) loading the instructions into the machine,
- (c) providing a roll of fabric,
- (d) dividing the fabric into sections,
- (e) operating the machine to cut the pieces of the set from a respective one of the sections, and
- (f) sewing the set of pieces together to form an article of clothing.



**FIGURE 12-5** Clothing manufacturing invention of Example 1.



*Analysis*

**Step (a)** This step may invoke the activities of a party other than the clothing manufacturer, creating a multiparty activity. In particular, creating the software instructions may be a service provided to the clothing manufacturer by the cutting machine vendor or yet some third party. Another problem is that the software instructions may be created overseas, creating a multiple-jurisdiction problem. Moreover, the machine may be “programmed” by some mechanical means or by hard-wired circuitry rather than software. Note, too, the potential narrowing effect of the word “fabric,” which is not usually thought to encompass such apparel material as leather.

**Step (b)** This step also potentially invokes the activities of a party other than the clothing manufacturer. The cutting-machine vendor, or some third party, might be the one who loads the instructions into the machine as a service to the clothing manufacturer. This step also raises a potential royalty base issue. Since the instructions are loaded into the machine only once for each different pattern, the Opposing Team will argue that the claim is infringed only a single time for each different pattern, no matter how many articles of clothing are made from that pattern. This argument is bolstered by the fact that the claim recites the creation of only a single article of clothing.

**Step (c)** This is a worthless step that serves no purpose other than to create mischief. The Opposing Team may argue that they don’t “provide” the fabric roll, but rather that it is provided *to* them by the fabric vendor, thereby invoking the activities of yet another outside party. The argument may not carry the day. It can be argued that “providing” reads on the clothing manufacturer’s action of mounting the roll on the machine. But no matter how unmerited the accused infringer’s arguments may be, they will have to be *argued* to be unmerited, adding to the complexity and expense of the suit. The “providing” step just gives the Opposing Team something else to argue about. A “providing” step is *always* superfluous because other limitations can be drafted so as to assume the existence of the thing “provided.” Another potential problem is the word “roll.” The fabric might be folded flat rather than being provided in a roll.

**Step (d)** This step can well be argued never to be infringed, because the cutting machine may not carry out any function that can be characterized as “dividing” the roll into sections, particularly if the fabric advances through the machine in a continuous motion. Even if the machine starts

and stops for each set of pieces, one may be hard-pressed to identify what operations of the machine constitute the affirmatively recited step of “dividing” the roll into sections.

**Step (e)** This step seems all right.

**Step (f)** This step presents a further potential single-infringer or multiple-jurisdiction issue. The set of pieces may be cut in the United States but shipped to an unrelated party for assembly overseas. It may be possible, however, to argue the applicability of 35 U.S.C. 271(f)(1).

#### *Suggested Claim*

A claim that avoids these problems is the following:

A method for mass producing garments using an automatic cutting machine, the method characterized in that all of the pieces of each garment are cut from a particular section of a length of clothing material associated with said each garment.

### **Example II: Internet Infrastructure**

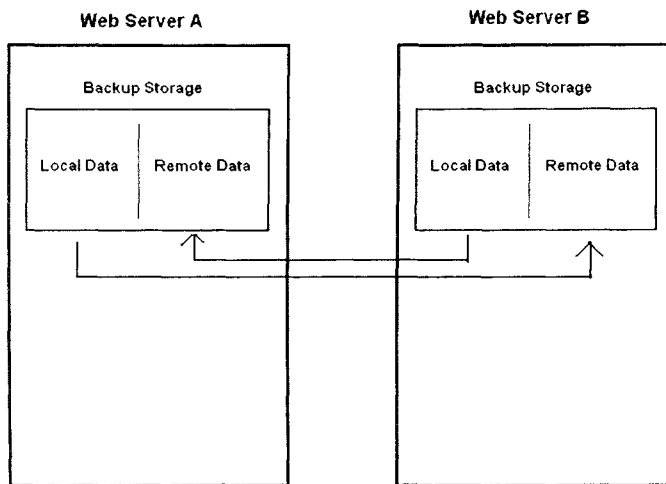
#### *Invention*

The disclosed embodiment involves two web servers. As shown in Figure 12-6, each web server has a backup magnetic storage medium (e.g., hard disc, magnetic tape, etc.) partitioned into two sections, one for storing a backup version of its own data and one for storing a backup version of the other web server’s data. In case a particular server’s backup data gets corrupted, another version is available from the other web server. The patent owner plans to assert the patent against web server manufacturers.

#### *Claim*

Apparatus comprising

- (a) a communications medium,
- (b) first and second web servers interconnected by the medium,
- (c) each web server including a backup magnetic storage medium on which data is stored,
- (d) each web server including means for formatting the backup storage medium into local and remote partitions and operating to store in the remote partition data received from the other server.



**FIGURE 12-6** Internet infrastructure invention of Example 2

### *Analysis*

**Element (a)** The web server manufacturer can point out that it does not make or sell the communications medium.

**Element (b)** The web server manufacturer can point out that the web servers are not interconnected when the manufacturer ships them.

**Element (c)** The web server manufacturer will point out that, contrary to the claim language, no data is stored on the web server when it leaves the factory. Moreover, the web server manufacturer may arrange its business model such that a server is shipped without the backup storage medium. The customers are advised that if they want the server to operate with the backup feature, they should order the backup medium separately from a third party. The web server manufacturer can also avoid this claim by designing the web server to use optical, rather than magnetic, storage media.

**Element (d)** The web server manufacturer will point out that its servers do not format the media but come preformatted from the media vendor. It may design its web servers to back up one another's data in groups of three or more in round-robin fashion—A backs up B, B backs up C, and C backs up A—rather than in reciprocal fashion required by the claim. The web server manufacturer will also argue that the servers aren't "operating" when they leave the manufacturer's shipping dock.<sup>16</sup>

*Suggested Claim*

A web server adapted to be interconnected with a second web server,  
the web server comprising

means for receiving a copy of data that is local to the second web  
server, and

means operative to store, in a first partition of a backup storage  
medium, data that is local to said web server, and to store, in a second  
partition of the storage medium, a copy of the received data that is  
local to the other web server.



We go a long way toward maximizing the value of the patent by ensuring that the invention is claimed in all of its commercially significant settings and that the claims capture the activities of individual direct infringers.

The value of the patent can also depend, however, on the invention being claimed using various statutory claim types. That is the subject of the chapter which follows.

## Notes

1. 35 U.S.C. 101.
2. Such a scheme is implemented in the NTSB standard broadcast television signal. See U.S. Patent 2,635,140 (issued April 14, 1953).
3. See p. 113.
4. The doctrine of patent exhaustion would typically preclude the patent owner getting royalties from both the integrated circuit manufacturer and the equipment manufacturer. See, *e.g.*, *United States v. Univis Lens Co.*, 316 U.S. 241, 53 USPQ 44 (1942).
5. See pp. 97–99.
6. 35 U.S.C. 271(a).
7. 35 U.S.C. 271(b).
8. 35 U.S.C. 271(c).
9. See, *e.g.*, *RF Delaware, Inc. v. Pacific Keystone Technologies, Inc.*, 326 F.3d 1255, 1268, 66 USPQ2d 1593 (Fed. Cir. 2003).
10. See, *e.g.*, *Moba, BV v. Diamond Automation, Inc.*, 325 F.3d 1306, 1320–21, 66 USPQ 1429 (Fed. Cir. 2003).
11. See, *e.g.*, *Shields v. Halliburton Co.*, 493 F. Supp. 1376, 1389, 207 USPQ 304 (W.D. La. 1980), *aff'd*, 667 F.2d 1232, 216 USPQ 1066 (5th Cir. 1982), 182 USPQ 644; *On Demand Mach. Corp. v. Ingram Indus.*, 442 F.3d 1331, 1335, 78 USPQ2d 1428 (Fed. Cir. 2006) (decided on other grounds).
12. See generally *Mobil Oil Corp. v. Filtrol Corp.*, 501 F.2d 282, 291–2 (9th Cir. 1974); *Faroudja Labs., Inc. v. Dwin Electronics*, 76 F. Supp. 2d 999 (N.D. Cal.

1999); *E. I. du Pont de Nemours & Co. v. Monsanto Co.*, 903 F. Supp. 680 (D. Del. 1995), *aff'd*, 92 F.3d 1208 (Fed. Cir. 1996)(unpublished).

13. 35 U.S.C. 271. By contrast, a party within the United States who interacts with a system, for example, over communication lines “uses” that system and is therefore an infringer, even if a portion of the system lies outside the United States. *NTP, Inc. v. Research in Motion, Ltd.*, 418 F.3d 1282, 75 USPQ2d 1763 (Fed. Cir. 2005).

14. See, *e.g.*, *Avery Dennison Corp. v. UCB Films PLC*, 1997 US. Dist. LEXIS 16535 (N.D. Ill. 1997).

15. See pp. 39–40, 92.

16. The manufacturer’s assertion that it does not meet any “operating” type of limitation can often be countered by pointing out that the manufacturer undoubtedly does operate the apparatus when testing it in the factory and/or when installing the apparatus on the user’s premises.



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## CHAPTER THIRTEEN

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### Statutory Claim Types

We saw in Chapter Twelve that maximizing a patent's value requires claiming the invention in all its commercially significant settings. In this chapter we will see that a patent's value also depends on claiming the invention using a particular one or more of the three main statutory claim types—method claims, apparatus claims, and composition claims. These derive from the four statutory subject matter classes defined in 35 U.S.C. 101: method claims for “processes”; apparatus claims for “machines” and “manufactures [manufactured items]”; and composition claims for chemical compounds and other “compositions of matter.”

Many inventions lend themselves to being claimed using a particular statutory claim type. A paper clip would certainly be claimed as a manufacture using an apparatus claim; an oil-refining procedure would be claimed as a process using a method claim, and so forth. However, many inventions can be claimed using more than one statutory claim type. In fact, maximizing the patent's value may depend on it.

The central consideration is the anticipated enforcement scenario. A patent infringer is one who, without authority, makes *or* uses *or* offers for sale *or* sells *or* imports a patented invention.<sup>1</sup> As a practical matter, the patent owner will typically want to assert her patent against only some of these, such as manufacturers or importers. This allows the patent owner to collect royalties (or obtain an injunction against infringement) at the wellhead; it is usually impractical to chase after innumerable wholesalers, retailers, or consumers. However, the ability to effectively assert a patent against a particular class of infringers may depend upon the statutory claim type(s) that were used to define the invention.

#### Apparatus (Machine/Manufacture) Claims

##### Apparatus Claims Generally

Many inventions are implemented in machines or as manufactures and, as such, are defined by apparatus claims. Indeed, for many inventions

this may be the only claim type that makes sense. The chair and paper-clip claims appearing throughout the book are examples of apparatus claims. Many biotech inventions, such as transgenic plants, are “manufactures” and are also defined by what are essentially apparatus claims, such as claim 13.1.

13.1 A transgenic plant comprising a transgenic eukaryotic cell encoding a plastid membrane transport polypeptide with at least 17 consecutive amino acid residues between residues 43 and 323 of SEQ ID NO:2.

Many patents have only method claims, even though apparatus claims could also have been obtained. This happens particularly for inventions implemented in software-based systems, such as telecommunications gear or medical diagnostic equipment. Signal processing inventions, such as speech recognition algorithms, are another example.

Limiting such inventions to method claims is usually not a good idea. Apparatus claims are readily asserted against manufacturers; they are infringed the moment the infringing apparatus comes into being at the end of the assembly line. By contrast, method claims defining the *operation* of an apparatus are infringed only when the operation itself is carried out. The direct infringers are not the manufacturers, but consumers or other users.

A manufacturer could be accused of inducing infringement of a method claim or being a contributory infringer.<sup>2</sup> However, as discussed in Chapter Twelve, it is preferable to be able to establish a case of direct infringement.<sup>3</sup> Moreover, damages for activities occurring prior to suit are available only if the accused contributory or inducing infringer had actual notice of the patent.<sup>4</sup>

Another problem with method-claim-only patents is that some methods are performed only a few times, severely limiting the royalty base. An example is a method for arriving at a design parameter for a product. Consider claim 13.2, which defines a method for determining the optimum area for a semiconductor chip AND gate to provide it with a very fast “rise time.”

13.2 A method for use in designing a logic gate of a semiconductor chip, the method comprising

designing the gate to have an area  $A$ , given by  $A = \beta I_c^{2/3}$ , where  $I_c$  is an impurity concentration of the semiconductor material, and  $\beta$  is the length of the longest intra-gate signal path.



This claim will be infringed only a handful of times—during the semiconductor chip design process. Obtaining any kind of significant royalty or damage award will be an uphill battle. By contrast, apparatus claim 13.3 is directed to the overall semiconductor chip that includes a gate resulting from the design algorithm.

13.3 A semiconductor chip having at least one logic gate whose area  $A$ , is given by  $A = \beta l_c^{2/3}$ , where  $l_c$  is an impurity concentration of the semiconductor material, and  $\beta$  is the length of the longest intra-gate signal path.

This apparatus claim will entitle the patent owner to a royalty or damages for each chip made.

One final advantage of apparatus claims is that they are not subject to the patent statute's so-called first inventor defense, which applies only to methods.<sup>5</sup>

### Computer-Readable Medium Claims

The anticipated enforcement scenario for software-implemented inventions gives rise to unique claiming issues.

A software-implemented invention can certainly be defined as a sequence of method steps. And it can be defined as apparatus that carries out those steps. The latter may be a particularly useful enforcement vehicle when the software comes preloaded in a computer since the computer manufacturer, and those in the chain of sale, are direct infringers.

However, a great deal of software is sold in stand-alone form on a compact disc (CD) or other computer-readable medium. The anticipated enforcement scenario may then involve asserting the patent against the software house directly. A method claim may be less than ideal in this scenario because the method steps are not performed by the software house but by the end user's computer. Similarly, apparatus that carries out the method steps does not come into being until the software is loaded from the CD into consumer's computer. The software house could be accused of inducing infringement or of being a contributory infringer. Again, however, it is desirable to be able to establish a case of direct infringement whenever possible.

These concerns are addressed by the computer-readable medium claim, also referred to as a Beauregard claim.<sup>6</sup> In its typical form, this specialized type of apparatus claim calls for a computer-readable or machine-accessible medium (e.g., a CD) storing program instructions that cause a computer to perform steps that implement the invention.

The infringing apparatus is the CD itself, claimed as a manufacture, as in claim 13.4:

13.4 An article of manufacture, comprising a machine-accessible medium having instructions encoded thereon for enabling a processor to perform the operations of  
receiving a request from a client comprising an identifier of the client;  
transmitting the identifier to a central registry containing characteristic profiles for plural clients;  
receiving a characteristic profile from the central registry that includes a processing potential for the client; and  
transmitting content to the client over a network, such content scaled according to the characteristic profile.

The usefulness of computer-readable medium claims extends beyond consumer-oriented software. Manufacturers of software-based industrial and telecommunications equipment distribute programs and program updates to their customers on computer-readable media.

### **Propagated Signal Claims<sup>7</sup>**

A propagated signal claim is another specialized type of apparatus claim. The subject matter of the claim is a signal per se, disembodied from any apparatus or method that generated the signal. Claim 13.5 is a propagated signal claim defining a data encryption invention.

13.5 A propagated signal comprising  
a first component representing a public key, said public key signed by a private key, said private key created in a first time interval, said public key created in a second time interval, said first time interval distinct from said first time interval;  
a second component representing a digital signature, said signature created during said second time interval if it is determined the certification request was received within the second time interval; and  
wherein said signature is created using a second private key, said second private key created during said second time interval.

Propagated signal claims provide at least two advantages in the anticipated enforcement scenario. Propagated signals can readily be captured electronically and analyzed. This can make it easier to prove infringement than when the invention is defined as a machine/manufacture or as

a process. Moreover, propagated signal claims may be infringed by parties that would typically not infringe any other claim type. These include telecommunications carriers, cable companies, and internet service providers over whose facilities the signal propagates.

### Method (Process) Claims

Many inventions are fundamentally processes or methods—chemical syntheses, computer algorithms, surgical techniques, business methods, and so forth. However, an invention definable in apparatus terms can often be defined as a method that the apparatus performs. See, for example, microwave oven claims 7.1 and 7.2.<sup>8</sup> Indeed, method claims may provide a significant advantage over apparatus claims in the anticipated enforcement scenario.

For one thing, it may be difficult to demonstrate a one-to-one relationship between the structural elements of an apparatus claim and the parts of an allegedly infringing apparatus. For example, the functions of two claim elements may be performed by a single, dual-purpose element in the allegedly infringing apparatus. Yet that same apparatus may infringe all the steps of a method claim.

For another thing, it may be impossible to inspect suspected infringing apparatus, such as machinery on a competitor's factory floor. Yet, it may be apparent from the product the machinery produces that the method is being performed. Having a method claim to assert can thus short-circuit a lot of pushback from the Opposing Team and help bring a licensing negotiation or settlement discussion to a successful conclusion.

Even when infringement of an apparatus claim can readily be demonstrated, a method claim may be far more valuable. An apparatus claim covering an improved shoe-making machine may yield a royalty for each machine sold to shoe makers. However, the aggregate value of infringing shoe-making machines that may be constructed during the life of the patent will pale in comparison to the aggregate value of the shoes made by those machines. Thus a method claim reciting novel shoe-fabrication steps performed by the machine can yield a much higher economic return to the patent owner.

A method claim can also prove to be more valuable than a composition claim. For example, a whole year's worth of a chemical composition used to fabricate integrated circuits may have a market value of no more than a few thousand dollars. Thus unless the patent owner's goal is to enforce her right of exclusivity, a claim directed to the composition per se may be of little benefit. By contrast, a method claim directed to an integrated circuit manufacturing method using the new composition would command a royalty for every integrated circuit made. For example, claim

13.6 recites a standard integrated circuit fabrication process in which the only novelty is in the formula for the new composition.

13.6 A process for fabricating a device comprising the steps of forming a radiation sensitive region on a substrate, patterning at least a portion of said region, and further processing said substrate characterized in that said region comprises a composition formed by a polymerization process employing a material represented by [formula for the new composition omitted].

Another benefit of method claims relates to recovery of damages for infringement occurring prior to bringing suit. It is possible to recover such damages in general. However, if the patent owner sells a product covered by apparatus claims, damages based on infringement of the apparatus claims are awarded only for the period beginning when the infringer had actual notice of the patent *unless* the product was marked with the patent number.<sup>9</sup> This marking requirement does not apply, however, if the patent contains only method claims.<sup>10</sup>

Yet another benefit is that even if a claimed process was used to make a product in a foreign country, the subsequent importation of the product into the United States constitutes an infringement of the method claim.<sup>11</sup>

### Composition Claims

Inventive compositions of matter—organic compounds, ceramics, peptides, biological material, and so on—should be claimed as such. Claim 13.7 is a composition claim.

13.7 A composition comprising an underfill material and an anhydride adduct of a rosin compound that comprises an ester of an organic rosin acid moiety.

A composition claim encompasses the composition itself, even if made by a process not contemplated by the inventor of the composition. It may also be advantageous to pursue method claims defining process(es) for producing the composition—either in the same patent application or a separate one.

### Product-by-Process Claims

A product-by-process claim is not a statutory claim type per se. It is a specialized type of apparatus or composition claim that defines a product

in terms of the process by which it is made. Claims 13.8 through 13.10 are product-by-process claims for a chemical composition, a frozen fruit gel, and a molded shoe innersole:

13.8 A polycarbonate produced by the process of

- (a) forming a reaction mixture which comprises a dihydroxy compound, a carbonic acid derivative, a solvent, and sufficient base to bring about the formation of polycarbonate; and
- (b) employing in said reaction mixture a chain terminator containing a hydroxy group, such that monocarbonate does not form.

13.9 A firm fruit gel having fibrous tissues that resemble those of a peach, which is produced by the steps of:

- (a) adding a fruit juice component to a component consisting essentially of konjak flour, alkaline agent, and water and stirring these components to form a mixture;
- (b) freezing the mixture; and
- (c) thawing the frozen mixture.

13.10 A molded innersole produced by the steps of

- (a) introducing an expandable, polyurethane material into a mold;
- (b) placing an elastomeric insert material into the mold, the insert material having greater shock-absorbing properties and being less resilient than the molded, open-celled polyurethane foam material;
- (c) etc.

Even though it recites method steps, a product-by-process claim is a claim to the product itself. The process steps are only the vehicle by which the product is defined. That being said, the law is unsettled as to whether a competitor manufacturing a product defined by a product-by-process claim infringes that claim if the competitor uses a different method to produce it.<sup>12</sup> By the same token, a product-by-process claim is unpatentable if the product is in the prior art, even if the process steps recited in the product-by-process claim are new.<sup>13</sup>

If the product in question can be defined by a composition or manufacture (apparatus) claim, it can be claimed that way as well.



Even under the constraints of a chosen claim scope, setting, and statutory claim type, there are virtually an unlimited number of ways to draft a claim to a given invention. Indeed, there is a good reason to draft several different versions of the broadest claims. The chapter that follows explains why and shows how.

### Notes

1. 35 U.S.C. 271(a).
2. 35 U.S.C. 271(b)–(c).
3. 35 U.S.C. 271(a).
4. *Manville Sales Corp. v. Paramount Systems, Inc.*, 917 F.2d 544, 554, 16 USPQ2d 1587 (Fed. Cir. 1990); *DSU Medical Corporation v. JMS Co., LTD* (Fed. Cir. 2006) (en banc).
5. 35 U.S.C. 273(b)(3)(A).
6. *In re Beauregard*, 53 F.3d 1583, 35 USPQ2d 1383 (Fed. Cir. 1995).
7. The status of signals per se as statutory subject matter is under review as of this writing. *In re Nuijten*, Fed. Cir., No. 2006-1371, 2/5/07 oral argument.
8. See p. 71.
9. 35 U.S.C. 287(a).
10. *American Medical Systems, Inc. v. Medical Engineering Corp.*, 6 F.3d 1523, 1537, 28 USPQ2d 1321, 1331 (Fed. Cir. 1993).
11. 35 U.S.C. 271(g).
12. *Compare Atlantic Thermoplastics Co. Inc. v. Faytex Corp.*, 970 F.2d 834, 23 USPQ2d 1481 (Fed. Cir. 1992), *suggestion for rehearing in banc declined*, 974 F.2d 1279, 23 USPQ2d 1801, 974 F.2d 1299, 24 USPQ2d 1138 (Fed. Cir. 1992) to *Scripps Clinic & Research Foundation v. Genentech, Inc.* 927 F.2d 1565, 18 USPQ2d 1001 (Fed. Cir. 1991) and *SmithKline Beecham Corp. v. Apotex Corp.*, 439 F.3d 1312, 78 USPQ2d 1097 (Fed. Cir. 2006).
13. *In re Pilkington*, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969).

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## CHAPTER FOURTEEN

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### Claim Diversity

A patent's enforcement is fraught with uncertainty. Claims may contain unappreciated loopholes—unnecessary elements, unduly narrow terminology, or limitations whose meaning seemed perfectly clear but could be argued to be indefinite. Another uncertainty is the discovery of prior art not cited during prosecution.

These problems may not surface until the patent owner attempts to license or sue on the patent, at which point it is usually too late to do much about them. Fallback feature claims<sup>1</sup> and definition claims<sup>2</sup> can go a long way toward addressing these uncertainties, but it is difficult to anticipate every possible invalidity scenario.

Yet another source of uncertainty is what the law will be at the time a patent is asserted.

Claim diversity—the subject of this chapter—is an approach to constructing the overall claim suite that addresses these and other uncertainties. A diverse claim suite presents the invention in different ways by, for example, organizing the limitations differently, using different terminology, or employing different combinations of functional and structural recitations. A particular defect in a claim that renders it too broad or too narrow or indefinite may not show up in another claim if they express the invention differently, albeit at the same level of breadth, in the same setting and using the same statutory claim type. Like the Planned Retreat, then, claim diversity improves the odds that the issued patent will have at least one claim that is both valid and infringed.

We never actually know whether any potential problems have been fixed. Any *known* claim defects are fixed before the application goes out the door. We simply take it as an article of faith that the more one claim differs from another, the more likely it is that any hidden defects in the first will not appear in the second.

Achieving a significant level of diversity in the claim suite may be easier said than done. Most types of inventions can be defined in a wide variety of ways. But once having slaved over a claim to get it just right, it is sometimes difficult to force one's brain to think about how the invention might be defined differently. It can be hard to put aside a particular

ingrained view of the invention—or a particular approach to claiming it—and head off in new directions.

This chapter presents some ideas for jump-starting the claim-drafting process into those new directions. These ideas apply not only to drafting broad claims, but claims at any desired level of breadth.

### **Recast the Problem-Solution Statement**

Drafting a new version of the problem-solution statement will readily yield a new claim, particularly when the problem-solution-based claim-drafting technique introduced in Chapter Seven is used. A different problem-solution statement may also provide us with a new “take” on the inventive departure, thereby yielding a different claim when using the inventive-departure-based approach of Chapter Eight. Two such claims are those drafted by William Dowss for John Loud’s ballpoint pen invention, discussed in Chapter One and presented again here:

14.1 A pen having a spheroidal marking-point, substantially as described.

14.2 A pen having a marking sphere capable of revolving in all directions, substantially as and for the purposes described.

Drafting a new version of the problem-solution statement may prove difficult, however. Just as with a claim we have lived with for a while, the original problem-solution statement may dominate our thinking to such a degree that nothing useful comes from an attempt to draft a new one. If that happens, simply move on to the other techniques described below.

In other cases, however, new ways of seeing the problem or the solution may arise as we become more familiar with the invention—particularly after the specification has been written. Such insights can be brought to bear in developing a different formulation of the problem and/or the solution.

### **Use Both Functional and Structural Recitations**

The book emphasizes the importance of functional claim limitations when reaching for claim breadth. Here, for example, is the typewriter backspace key expressed in purely functional terms:

14.3 A typewriter adapted to move its carriage to a previously typed-at position through an intra-typewriter operation initiated in response to a predetermined user action.

This claim calls for no particular structure or, indeed, *any* structure by which the carriage movement is effectuated. Defining an invention func-



tionally, rather than structurally, makes it harder for others to avoid the claim by implementing the functions and relationships inherent in the claim but using them with different structural elements.

Having drafted a very functional claim, however, we can endeavor to write one that has more structure to it and, in so doing, enhance the diversity of the overall claim suite.

Structural limitations in a claim can be specific physical elements or means-plus-function elements. The former are primarily defined by what they *are*, the latter by what they *do*. For example, claim 14.4 defines the invention of the backspace key in terms of physical elements, and claim 14.5 defines the same invention using means-plus-function elements.

#### **Physical Elements Claim**

14.4 A typewriter comprising  
a plurality of alphabet keys,  
a carriage that moves in a first direction when one of the alphabet keys is depressed,  
a control key, and  
a mechanical linkage interconnecting the control key and the carriage and that moves the carriage in a second direction when the control key is depressed.

#### **Means-Plus-Function Claim**

14.5 A typewriter comprising  
printing means for creating printed characters on a carriage-carried platen in response to the operation of alphabet keys,  
advancement means for moving the carriage forward after each character is printed, and  
backspace means responsive to user operation of a backspace key for moving the carriage backward when the control means is operated.

As noted above, a wider range of equivalents may be accorded to a structural recitation than to a means-plus-function recitation. In the backspace key example, claim 14.4's combination of the control key and mechanical linkage may be interpreted more broadly than claim 14.5's backspace means. Then again, a means-plus-function element may be given the wider range of equivalents, depending on the invention in question and the state of the law at the time the claim is being interpreted.

Claim diversity is enhanced by using all three types of recitations—purely functional, structural, and means-plus-function—either in a consistent-throughout-the-claim form, per claims 14.3 through 14.5, or in mix-and-match combinations.

### **Vary the Terminology**

Varying the claim terminology is another facet of claim diversity. Certain words or phrases may be interpreted more narrowly or more broadly

than others, even while seeming to convey the same idea. Advantageously, then, varying the terminology may narrow a claim that would otherwise be so broad as to read on prior art or may broaden a claim that would otherwise be narrower and miss certain competitors' implementations of the inventive concept.

Just thinking about different ways of expressing things may open the door to invention-broadening insights that can be used more extensively throughout the claims. For example, we may have started out using the term "cooking" in all of the claims directed to a microwave oven invention. But upon searching for other ways to express the invention, we may realize that the word "heating" might be a better choice for most of the claims, "heating" undoubtedly being a broader term.

Here are some other examples of claim terminology alternatives.

- peptide / protein
- fastener / attachment mechanism
- telecommunications network / telephone system
- refreshing the web page / fetching a new version of the web page

These alternatives might be deemed to mean exactly the same thing as one another. In some contexts, however, one might prove to be broader or narrower than the other. Or one term might be deemed indefinite but the other not.

### **Enforced-Format Claiming**

Enforced-format claiming is yet another way to get our thinking onto a different track. Per this technique, we arbitrarily impose one or more claim format options on the claim to be drafted. For example, if an already drafted claim has a minimal preamble, the imposed claim format option may be to pack the preamble with as many of the claim limitations as possible. A number of other claim format alternatives are suggested below, followed by three illustrations of the technique.

Enforced-format claiming forces us to head off in a new direction in defining the invention. The selected format options may be ones that we do not employ regularly or that may seem unnatural. This is all to the good, as it can shake us out of the very comfort zone that may stand in the way of achieving a more diverse claim suite.

Enforced-format claiming is analogous to painting a landscape. Before an artist begins to paint the scene, she must first make some format choices. What will the orientation of the canvas be? What direction does the light come from? Where is the vanishing point? Only after deciding

on these aspects does the artist begin to inform the chosen framework with the subject matter itself.

Enforcing certain format choices will typically have a ripple effect on the more substantive aspects of the claim. Certain format options may force the claim elements into a different order of presentation. This, in turn, may require different recitations to stitch the claim elements together. Limitations that seemed unavoidable when the claim was put together in one way may need to be stated differently—or may prove to be unnecessary altogether—when the claim is assembled in some other way. The resulting claim may well be quite different from any of those already drafted.

It may become apparent as a claim evolves that certain format choices will not work well with others, or that they may not be suitable for the invention at hand or for the chosen setting. Other format choices can be tried out in real time as the claim is being drafted. Any chosen format option should be abandoned if the claim seems to work better without them. They were, after all, chosen arbitrarily in the first instance.

Many format alternatives work well for claims in almost any technology. Others are more technology-specific. Some common format choices of both kinds are presented below.

Readers who have been drafting claims for while will recognize particular format choices that they normally gravitate to. The point of the enforced-format technique is to force ourselves to try out some others.

The discussion of the format choices is followed by some exemplary claims illustrating the enforced-format technique.

### **Functional vs. Structural Limitations**

An invention can be expressed in functional or structural terms. Structural components, in turn, can be recited as physical or means-plus-function elements. Use of this option is illustrated above in connection with the *backspace key* invention.

### **Number of Elements or Steps**

An apparatus claim can have 0, 1, 2, or more individual claim elements. Similarly, a method claim can have 0, 1, 2, or more individual method steps.

### **Preamble Length**

The claim preamble can be very minimal, for example, “Apparatus comprising. . . .” Another option is to pack into the preamble as many of the claim recitations as possible, leaving for the body of the claim as few as one method step or structural element or something in between.

### **Preamble Content**

The preamble can contain functional statements, method steps, apparatus elements or mix-and-match combinations of these. It is common, for example, for a method claim preamble to establish an apparatus context for the recited method steps. It is also possible for the preamble to have no content other than a standard phrase such as “A method comprising.”

### **Problem to Be Solved**

It can be dangerous for a claim to recite the problem to be solved, as discussed earlier (p. 74). In the interest of claim diversity, however, some claims may explicitly recite the problem.

### **Treatment of the Inventive Departure**

The inventive departure appears at the end of many claims—the natural result of defining an invention in terms of a structure or process in the prior art to which something new is added. However, a different set of words defining the invention can evolve by forcing the novel part of the claim to appear elsewhere.

Another format choice is the relationship of the inventive departure to the other limitations. There are at least three choices here. The inventive departure can be recited as

- one or more stand-alone elements or steps,
- a sub-element or sub-step of another element or step, or
- a functional characterization of one of the other elements.

### **Underlying Scientific or Engineering Theory**

Many inventions are based on some underlying engineering or scientific discovery or theory. For inventions of this type, the claim drafter can choose either to

- ignore the discovery or theory and simply recite the structure or steps that take advantage of it, or
- make the discovery manifest in the claim.

We definitely want claims of the first type; the inventor’s theory as to how or why the invention works as it does may prove to be incorrect, providing the Opposing Team with an opening to argue against the claim’s validity. But, again, in the interest of claim diversity, claims that explicitly recite the invention’s underlying theory can be drafted as well.

### **Mathematical Limitations**

Certain kinds of method steps, interrelationships among physical elements, and other aspects of many inventions can be described using mathematical expressions. Mathematics provides a precision that words often cannot. On the other hand, math in a claim has the potential to limit the boundaries of the claimed subject matter in unintended ways. The aims of claim diversity are served by using both mathematics and words.

### **Granularity**

Certain inventions appear in modules or basic building blocks that are interconnected with like units. An example is a novel integrated circuit memory element that is interconnected in a matrix with millions of other identical elements. The invention can be claimed as a stand-alone memory element. It can also be claimed as an interconnected matrix of such elements.

### **Time Perspective**

Some inventions involve an algorithm or other set of method steps that are performed repetitively. For example, an MPEG encoder operates on successive video frames, applying the same set of encoding steps to each frame. The format choice here is the time-domain equivalent of the granularity choice just described. The algorithm can be defined in terms of the operations applied to a single video frame or, alternatively, to a sequence of frames. In a similar vein, some processing inventions can be claimed statically, as though frozen in time, or in terms of an ongoing operation.

### **Signal Domain**

Many signal processing inventions—perhaps most, these days—are carried out in the digital domain and operate on digital signal samples. A claim can certainly define an invention in those terms. However, we may be able to define the invention without putting it in any specific signal domain by reciting the processing of generic “signals” rather than digital “signal samples.”

### **Enforced-Format Examples**

The enforced-format claiming technique is illustrated below using three inventions. The claims shown in the examples are of varying scope, in the interest of illustrating a wide range of format choices.

The table following these examples indicates which of the above-listed options are implemented in which claims. As noted earlier, those options are but a sampling of the various ways in which claims and their recitations can be formatted.

### Example I—Web Search

#### *Statement of Invention*

There are thousands of Internet search engines that specialize in particular topics, or “search domains,” such as medical, sports, jobs and careers, and so forth. By knowing the name of the search engine for a particular topic, it is of course possible to visit the search engine’s site and input a search string there. In general, however, users know few, if any, specialized search engines, relying on the general-purpose search engines instead. A problem is that the general-purpose search engines often return many irrelevant hits.

The inventive concept is for software to perform an automatic analysis of the content (text) of an input search string to identify a relevant search domain and to submit the search string to a search engine that specializes in that search domain.

#### *Claims*

1. A software interface that submits words of an input search string to a specialized search engine identified by an automatic computer analysis of the search string.
2. A software interface of a type that carries out the steps of receiving an input search string and submitting it to a search engine, the interface comprising  
means for submitting the input search string to a specialized search engine, the submitting means including means for identifying the search engine based on an automatic computer analysis of the contents of the search string.
3. A method in which the number of extraneous search engine hits in web searches is minimized by submitting search strings to respective search engines, each specializing in a search domain relevant to the respective search string, the method comprising  
automatically identifying the relevant search domain for each search string based on the contents of that search string.
4. A method for submitting an input search string to a search engine, the method comprising  
minimizing the number of extraneous returned hits by submitting the search string to a search engine that specializes in a search domain relevant to the search string, said minimizing comprising

- (a) automatically identifying at least one search domain based on the search string, and
  - (b) identifying as said search engine a search engine that specializes in the identified search domain.
- 5. A method performed by a computer system, the computer system including a screen, browser software that displays a search window on the screen, a keyboard for inputting search strings into the window and a memory that stores a list of specialized search engines, the method comprising
  - analyzing each search string to identify a particular search engine on said list based on the contents of the search string, and
  - submitting each said search string to the identified search engine.

### Example II—Run-Length Coding

#### *Statement of Invention*

It is always desired to be able to transmit or store as much information content as possible using as few bits as possible.

The inventive concept is to exploit the fact that certain kinds of signals have long runs of identical or substantially identical data. For example, a scanned black-and-white image will typically have long runs of 0s (representing, say, “white”) and/or long runs of 1s (“black”). This fact is exploited by generating a coded signal that contains digital words whose values represent the length of the runs, rather than the runs themselves. Thus the bit string 0000000111100011111 would be represented as 111 100 011 110, these being the binary values of the run lengths 7, 4, 3 and 6.

#### *Claims*

- 6. A method that compresses a signal by encoding the lengths of successive runs of portions of the signal that are identical.
- 7. A method for processing a binary input signal to reduce the number of bits needed to represent it, the method comprising
  - (a) incrementing a count if the value of an individual bit of the input signal is the same as the value of the previously input bit,
  - (b) outputting the count and then resetting the count to the value “1” if the value of the bit is different from the value of the previously input bit, and
  - (c) repeating (a) and (b) for each successive bit of the input signal.
- 8. A method of generating a sequence of output words  $W(i)$ ,  $i = 1, 2, 3, \dots$  in response to an input signal comprised of interleaved runs of 0s and 1s, the output words being given by
 
$$W(i) = \text{count}(i)$$
 wherein count (i) is the number of bits in the  $i^{\text{th}}$  run.

9. Apparatus for encoding an input signal made up of 0s and 1s, the apparatus comprising  
means for generating counts of the number of 0's in each run of 0's in the signal and the number of 1's in each run of 1's in the signal, and  
means for generating an encoded signal comprising digital words each representing a respective one of the generated counts,  
the input signal having a sufficiently large average run length that the number of bits required to represent the run lengths is less than the number of bits in the signal being encoded.
10. Apparatus of a type that performs the steps of receiving a binary signal, converting the signal into a succession of code words that represent the values of the bits of the signal and applying the code words to an output,  
characterized in that in the converting step, the apparatus generates, as the code words, digital words representing the lengths of runs of 0s and 1s in the binary signal.

### **Example III—Modular Flooring**

#### *Statement of Invention*

Computer rooms and other facilities are built with a raised floor made up of floor panels supported by an underlying framework, so that wiring, plumbing, and other utilities can be run along the "real" floor below. The panels can be lifted up individually at any time for utility access.

Normally the panels are supported solely by the underlying framework. The inventive concept here is for each panel to have a projection that extends under at least one adjacent panel, thereby providing additional support for that panel. The benefit is reduced flexure of the flooring.

#### *Claims*

11. A rectilinear modular floor panel having a projection extending from its underside projecting beyond an edge of the floor panel and having a ledge on the opposite edge adapted to engage a similar projection extending beyond an edge of another floor panel when said panels are installed on a grid.
12. A modular floor panel adapted to be installed in a modular floor along with at least two adjacent floor panels, the modular floor panel comprising  
a panel body,



means for supporting one of the adjacent panels, and  
means enabling said panel to be supported by the other of the adjacent panels.

13. A modular floor comprising  
a support grid, and  
a plurality of panels arranged in spaced relation and supported by the grid, each of the panels comprising  
a panel body,  
means for supporting an adjacent panel, and  
means resting on a supporting means extending from another supporting panel.
14. A modular floor of the type in which floor panels are supported above a floor of a building by a supporting understructure, the floor panels providing further support for one another in such a way that the floor has less flexure at the interface between adjacent panels than if said further support were not provided.

The table on the following page indicates which enforced-format claim options were used in drafting the claims of the above three examples.



This brings us to the end of what the book has to say about drafting claims. The chapter that follows completes this Part III by presenting a collection of checklists setting forth the main claim-drafting points and prescriptions offered in Parts II and III, with references to the relevant material in the text.

### Notes

1. See Chapter Six, pp. 53–64.
2. See Chapter Ten, pp. 115–121.

	Web Search					Run-Length Coding					Modular Flooring			
Invention Example														
Claim Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	<b>Functional v. Structural Limitations (Apparatus Claims)</b>													
Pure Function	■									■				■
Means + Function		■							■			■	■	
Physical Elements											■	■	■	
	<b>Number of Apparatus/Method Elements</b>													
0	■					■		■		■				■
1			■								■			
2+		■		■	■		■					■	■	
	<b>Preamble Length</b>													
Minimal	■					■		■			■		■	■
In-between		■		■			■		■			■		
Extensive			■		■					■				
	<b>Preamble Content</b>													
None	■					■		■			■		■	■
Functional Apparatus (in method claims)			■	■			■		■			■		
Method (in apparatus claims)		■								■				
	<b>Problem to Be Solved</b>													
Recited			■	■			■							
	<b>Inventive Departure Position</b>													
End of claim		■	■	■				■		■		■	■	
Elsewhere	■				■		■		■	■	■			■
	<b>Inventive Departure Relationship to Other Recitations</b>													
Stand-alone			■		■		■		■		■	■	■	■
Sub-element/step		■		■						■				
Functional	■					■		■						
	<b>Time Perspective</b>													
Ongoing process or multiple			■		■		■	■	■	■				
"One-time"	■	■		■		■								
	<b>Mathematics</b>													
Used							■							
	<b>Granularity</b>													
Individual element											■	■		
One of many													■	■
	<b>Underlying Theory</b>													
Recited								■						■
	<b>Signal Domain</b>													
Signals generically						■								
Binary/Digital							■	■	■	■				

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## CHAPTER FIFTEEN

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### Claim Review with Enforcement in Mind

Having drafted all our claims, we need to review them with the anticipated enforcement scenario in mind. The claim review should be carried out at two levels: the overall claim suite level and the individual claim level.

At the overall claim suite level, we need to assure ourselves that the patent application contains all the claims that it should. And at the individual claim level, we should assure ourselves that each individual claim fulfills the function that was intended for it.

This chapter presents of a set of checklists for carrying out both levels of review. Page references for each checklist item point the reader to the relevant material.

#### **Reviewing the Overall Claim Suite**

##### **Unpatentability/Invalidity**

The overall claim suite should have claims that address the possible unpatentability/invalidity of the application's broadest claims. To this end, the claim suite should include

- Fallback feature claims (pp. 53–64)
- Independent embodiment claims (pp. 105–112)
- Claims that are optimally chained within families (pp. 123–137)
- Claims that define the invention in diverse ways (pp. 173–183)

##### **Maximizing the Patent's Value to Its Owner**

The overall claim suite should be reviewed to ensure that the claims will maximize the patent's value to the patent owner. To this end, the claim suite should include

- Claims that define the invention in all of its commercially significant settings and capture individual direct infringers (pp. 143–162)
- Claims that define the invention using all appropriate statutory claim types (pp. 165–172)
- Claims that capture the maximum royalty base (p. 113)

### **Reviewing Individual Claims**

The claims need to be reviewed individually to be sure each carries out the function intended for it.

It is virtually impossible to review a claim in all of the ways that are appropriate in one editing pass. There is too much to think about. It is better to focus on each aspect in turn and pass through the claims with that one aspect in mind.

### **Unduly Narrowing Limitations**

A claim should not include limitations that define the invention more narrowly than intended. The “usual suspects” include limitations that

- explain rather than define (pp. 91–94)
- are needed only to support some dependent claim recitation (pp. 99–100)
- are “structural” when they could be functional (pp. 94–95)
- are modifiers (adjectives and adverbs) not necessary to define the invention over the prior art (pp. 87–89, 95)
- are data values, parameters, or measurements that a genie could provide and that, therefore, do not have to be generated from within the claim (pp. 97–99)

### **Claim Overbreadth and Indefiniteness**

Claims should also be evaluated to make sure that they are not so broad as to read on the prior art. In doing so, we should

- read the claim as broadly as possible, as an examiner will (pp. 45–47)
- fix an overbroad claim by narrowing/adding claim elements *or* by narrowing the environment or context in which the invention is claimed (pp. 48–50).
- backstop terminology with definition claims to anticipate possible overbreadth based on invention-irrelevant prior art (pp. 116–118)
- backstop terminology with definition claims to anticipate possible indefiniteness (pp. 118–119)

## Violations of the Invention-Setting Boundary

Make sure that the claim does not spill over its setting to involve the activities of more than one party. Discovering violations of the invention-setting boundary is a matter of asking the following:

- Do all the affirmative claim limitations read on that which a single infringer will do (pp. 151–154)? The “usual suspects” here include
  - Inputs and other signals that could come from elsewhere (pp. 147–150)
  - Limitations that affirmatively recite the environment and/or recite that the inventive apparatus is connected to that environment (pp. 150–151)
  - Method steps that might be performed by multiple parties, especially if one of them is outside the United States (pp. 155–157)
- Does the claim read on the product as it will be vended, sitting on the competitor’s shipping dock (p. 150)?
- What “batteries” might the Opposing Team not include with their product as shipped (p. 151)?
- What limitations in this claim could a competitor latch onto in order to avoid infringement, especially if the competitor was willing to change its manufacturing regime or business model (pp. 155–157)?

## Formalities

Finally, we need to attend to various housekeeping matters and formal requirements. These include

- Consistent internal logic. The recited claim elements should “hang together” in a logical way. Each element or step should have some physical or functional relationship with each other element or step—either directly or through some other step.
- Conformity with the requirement that the drawing must show every feature of the invention specified in the claims.<sup>1</sup> This is a good way of verifying that a claim does not call for more elements (particularly means for doing this or that) than are actually present in the embodiment(s).
- Antecedent basis for all “the” and “said” recitations.
- Grammar and punctuation.

## Note

1. 37 C.F.R. 1.83(a).



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P A R T   I V

*Preparing and Prosecuting  
the Patent Application*





## Introduction to Part IV: Preparing and Prosecuting the Patent Application

PART IV—*Preparing and Prosecuting the Patent Application*—addresses three topics: preparing the specification, responding to claim rejections during prosecution, and working with the inventor. These activities may seem unrelated, but each should be informed by the same notions that inform the analysis and claiming of the invention—the inventive concept, the problem, the solution, and the fallback features.

CHAPTER SIXTEEN begins the overall topic of preparing the specification by considering who its audience is and what their needs are. It then focuses on the first two sections of the specification—the Background of the Invention and the Summary of the Invention—and explains how the problem-solution statement can serve as the basis for an effective, story-telling Background and Summary that can engage that audience and, in the process, advance the interests of the patent owner.

CHAPTER SEVENTEEN shows how the Background and Summary provide a framework on which the Detailed Description can be built to advance the problem-solution story. The chapter also offers suggestions for streamlining the process of writing the Detailed Description more efficiently. The prescription *Be Detailed Where the Invention Lives* is introduced as a guide for determining which details of the embodiment(s) the Detailed Description should actually include.

CHAPTERS EIGHTEEN and NINETEEN then turn to claim rejections and amendments. The heart of Chapter Eighteen is a flow diagram laying out the six options one can take when a claim is rejected under 35 USC 102 or 103, based on the answers to four questions about the cited prior art. Chapter Nineteen then homes in on the use of the invention analysis principles described in earlier chapters as the basis for amending claims in the most appropriate way, should amendment prove to be the desirable option.

CHAPTER TWENTY describes a methodology for the inventor interview. Over time, each practitioner develops an approach that seems to work best for him. This chapter was written mostly with the novice in mind. It

introduces the notion of “self-directed learning” as an efficient way of using the inventor as an information resource to get at the problem, the solution, and the fallback features. The chapter then goes on to describe a collaborative process through which the patent lawyer and inventor can write the patent application together.

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## CHAPTER SIXTEEN

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# Writing the Background and Summary

The writing of a patent specification should be guided by the same principles that guide invention analysis and claiming: problem, solution, and inventive concept. Another important consideration is the specification's intended readership.

This chapter begins with a discussion of "the audience" and then focuses in on the specification's Background and Summary. The chapter that follows discusses the Detailed Description.

### The Audience

A patent specification must be detailed enough to enable a person skilled in the art to practice the invention. This is the so-called enablement requirement of 35 U.S.C. 112:

The specification shall contain a written description of the invention . . . [sufficient] to enable any person skilled in the art . . . to make and use the same . . .

Enablement is only a minimum legal requirement, however. An effective specification speaks to an audience extending far beyond the person skilled in the art. In fact, although we often say that the audience for the specification is the person skilled in the art, there is no such real-life reader. The person skilled in the art is only a legal construct defining a standard for the specification's required level of detail.

The specification's real-life audience is multifaceted, comprising the patent examiner, the Opposing Team, and possibly a judge and jury. When written with this wider audience in mind, the specification can further the interests of the patent owner in ways that a specification that is minimally enabling may not. Such a specification can facilitate allowance in the Patent Office, make the patent easier to license, and provide an effective platform from which a litigator can argue the merits of the invention to the judge and jury.

In one sense, everything ultimately does come down to the claims. The examiner, for example, is principally focused on ensuring that the claims do not read on the prior art. However, allowance of the claims is helped along when the examiner understands what the invention is and is convinced that there is inventive subject matter to *be* claimed. The specification is the place to convince him of that.

The Opposing Team is also focused on the claims. They want to know whether or not the claims read on their product. But even if the claims do read on the Opposing Team's product, they will resist taking a license unless convinced that their product takes advantage of something novel taught by the patentee. The patent owner's goal is for the Opposing Team to lay down their arms and take a license with as little fuss as possible. They will certainly not do so if they feel they are being asked to pay something for nothing. The specification is a place to convince the Opposing Team that they are *not* being asked to pay something for nothing.

Judges and juries must decide if the claims are valid and infringed. But before they hand over millions of dollars to the patent owner, judges and juries want to believe that justice is being done—that the essence of the invention has actually been appropriated by the accused infringer. They are therefore likely to look to the specification to be assured that justice *is* being done. Patent claims are a mystery to most non-patent professionals—a seemingly impenetrable morass of “saids” and “means for.” The specification should be expressed in “regular” English to encourage judges and juries to try to read and understand it. Indeed, a patent application that is easy to read and understand is more likely to get the attention of a busy judge. A jury convinced that the inventive essence has been appropriated may return a finding of infringement even if the claims somewhat miss the mark.

A specification that achieves all of this is more than just a compendium of technical facts. It tells a story. It is a story of a problem, and of a solution made possible by the patentee's recognition of something that others did *not* recognize. Ideally, that story is told twice—once in the Background and Summary, as discussed in this chapter, and again in the Detailed Description, as discussed in the chapter that follows. Each of the two tellings is built upon and amplifies the problem-solution statement.

## The Background

The Background tells the story of a problem that others could not solve, or could solve only partially or only in a complex or expensive way.

An effective Background brings the reader to a point of dramatic tension. By the end of the Background, the reader should be thinking two things: “Yes, I see that there is a problem,” and “I wonder how they solved it. Let me read on.”

It is not difficult to construct such a Background, but there are ways to enhance its story-telling effectiveness. These are illustrated both by examples in the discussion below and by a fictional patent for the invention of the chair presented in Appendix C.

### **Begin with the End in Mind**

Chapter Eight alluded to Stephen Covey's exhortation, "Begin with the End in Mind." There we were talking about drafting a claim by working backward from the inventive departure. The same idea applies to the Background. Its presentation of the prior art is driven by where the story is headed—the inventive solution. As discussed below, the style of Summary recommended by the author starts out with a one-sentence statement of the inventive solution. This is possible only if the necessary groundwork has been laid in the Background. Indeed, anything that is in the Background should be there because, one way or the other, the Summary relies on its being there.

### **Keep It Short and Conclusory**

The problem is best described at a high level, without a lot of detail. This does not mean skimping on the story line. The Background should provide a full accounting of the problem and how the prior art falls short of solving it. But the technical details of the prior art should be kept to a minimum. The story moves along just fine if the prior art is described only in general terms. The Background best holds the reader's attention when it says as little as needed to make its point.

The following Background, for example, goes into too much detail about the prior art. The writer seems to have felt compelled to *prove* the stated prior art disadvantage—namely that it "requires a considerable amount of control equipment." Readers are rarely interested in all of that. They are usually happy to accept the writer's word for it, and so a version that eliminates the crossed-out material serves perfectly well.

#### **Background of the Invention**

A known metal extraction technique described in U.S. Patent 6,—,— involves use of an extraction cylinder equipped with timing controls for sequentially pulsing a slurry and controlling the operation of various valves. The operation is controlled based on the proportions in percent of metal extracted from the cylinder as the process proceeds. The extracted metal is thereby maintained at a substantially constant purity.

Disadvantageously, this approach requires a considerable amount of control equipment. ~~For instance, it requires interface~~

~~control means positioned at one or several interfaces in the cylinder to detect a change in position of the liquid metal interface during operation of the cylinder as well as another timing device in communication with the interface control means and with the first timing means to adjust the first mentioned timing means, which control the introduction and withdrawal of the material so as to maintain the interface in substantially the same position throughout the extracting operation.~~

We might even consider limiting the first paragraph to just its opening sentence, resulting in the following, perfectly serviceable Background that tells readers everything they need, or want, to know about the problem.

### **Background of the Invention**

A known metal extraction technique described in U.S. Patent 6,—,— involves use of an extraction cylinder equipped with timing controls for sequentially pulsing a slurry and controlling the operation of various valves. Disadvantageously, this approach requires a considerable amount of control equipment.

There are always exceptions. Describing particular prior art in intricate detail may be the only way to convey an understanding of the problem to the reader. Or we may feel that the argument for the nonobviousness of the invention is bolstered by presenting a long litany of others' failed attempts. The key is for the Background to include only that prior art—and only at the level of detail—that is necessary to bring home to the reader (a) that there really is a problem, (b) what that problem is, and (c) that the prior art hasn't solved it in the most effective way, if at all.

The Background is the first and best opportunity to engage the reader. Typically the reader will start reading the specification at its beginning—the Background—and will continue reading as long as he can follow what's being said. The Background should therefore be as engaging to a broad readership as possible. This is sometimes a tall order. An esoteric technology can make for difficult reading. All the more reason to write a streamlined Background that makes its points and moves on.

### **Don't Refer to the Drawings in the Background**

It is usually better not to refer to the Drawings in the Background. A difficulty in articulating the problem without reference to the Drawings may well signal that we haven't fully come to grips with what the problem is. This can result in an unduly narrow understanding of the invention and, therefore, unduly narrow claims. In addition, diverting atten-

tion to the Drawings and away from the text can disrupt the Background's story-telling.

If a more full-blown exposition of the problem—including reference to the Drawings—is desired, it is better to present it at the start of the Detailed Description.

### **Don't Give Away Inventor Discoveries to the Prior Art**

The typical problem-solution scenario involves a problem already known in the art. Sometimes, however, the inventor's contribution to the art is discovery of the source of a *known* problem or even simply the *existence* of a problem. In either case, that discovery should be introduced in the Summary, not the Background. Otherwise, the Opposing Team can argue that the inventor has admitted that the prior art already knew about the problem and/or its source. There may be no invention left to patent if that were to be the case, because often the solution is quite obvious once the source, or existence, of a problem is known.

Consider, for example, the discovery that a source of rear-end automobile collisions is that the traditional height of brake lights causes them to be less noticed by the driver behind than if they were higher. The inventor's solution is to have at least one brake light at about 45 inches above the ground, the typical driver line-of-sight height. This, then, is the desired claim:

A motor vehicle having at least one brake light at a height of about 45 inches off the ground.

Patentability of this claim is best supported by putting the inventor's recognition in the Summary, not in the Background. Otherwise, the whole invention is given over to the prior art; the solution is a no-brainer once the source of the problem is identified. One is reminded of the old doctor/patient joke:

Patient: Doctor, it hurts when I do this. (Low brake lights).

Doctor: Then don't *do* that. (Don't put them so low.)

The idea that the brake lights are too low should not, therefore, be discussed in the Background. The Background should focus on the problem of rear-end collisions and other, *known* sources of the problem, such as tailgating. The discovery that the traditional standard brake light height is not optimal for collision avoidance should be saved for the Summary.

The following are two versions of a Background and Summary for this invention. The "Wrong Approach" puts the inventive realization in the Background. The "Right Approach" puts it in the Summary.

**Wrong Approach****Part of Inventor's Contribution  
Appears in the Background***Background*

Rear-end automobile collisions continue to be a problem. The principal sources of such collisions have been believed to be driver inattention and tailgating. Defensive driving courses and public service announcements have helped somewhat, but these measures have not been fully effective.

Another source of rear-end collisions is that brake lights positioned at the traditional height of about 25 inches above the roadway are not in the direct line of sight of the driver in the vehicle behind and, as a result, can escape that driver's notice, especially when the driver is daydreaming or focused on something to the side of the road.

*Summary*

In accordance with the invention, an automobile is provided with at least one brake light that is located approximately 45 inches above the roadway, a height that is more in line with the typical driver line of sight.

**Right Approach****All of Inventor's Contribution  
Appears in the Summary***Background*

Rear-end automobile collisions continue to be a problem. The principal sources of such collisions have been believed to be driver inattention and tailgating. Defensive driving courses and public service announcements have helped somewhat, but these measures have not been fully effective.

*Summary*

At the heart of the present invention is my discovery that another source of rear-end collisions is that brake lights positioned at the traditional height of about 25 inches above the roadway—and thus not in the direct line of sight of the driver in the vehicle behind—can escape that driver's notice, especially when the driver is daydreaming or focused on something to the side of the road.

In accordance with the invention, then, an automobile is provided with at least one brake light that is located approximately 45 inches above the roadway, a height that is more in line with the typical driver line of sight.

Note how the "Wrong Approach" gives over the heart of the inventor's discovery to the prior art. It focuses the question of patentability on whether it would be obvious to raise the brake light height if one knows that the traditional height contributes to rear-end collisions. It could be argued that this version of the story admits that the prior art already knew that, taking all the wind out of the sails of the invention and, indeed, possibly scuttling it altogether.

The "Right Approach" by contrast, gives no clue as to the inventor's discovery. Unlike the first version, this one does not imply that anyone knew that the 25-inch height was a contributing factor to rear-end colli-



sions. Desirably, the inventor's contribution to the art comes as a surprise when it emerges in the Summary. The stage on which patentability will be played out will be whether it was known or obvious that the traditional brake light location contributed to rear-end collisions—not whether it was obvious to raise the height once that fact is known.

An examiner is not likely to reject an invention based on what might be seen as a technicality of formatting. But the Opposing Team will make as much of it as they can in licensing discussions or litigation. "If your inventor supposedly discovered the source of the problem," they will argue to the patent owner, "how come she talks about it in the Background?"

As noted above, the inventor's contribution is sometimes her recognition that there even *is* a problem. An example is the repeating typewriter (and later, computer) key, where a character or space is repeated for as long as its key is depressed. Typists typed for almost a century without this convenience (no doubt made possible by the advent of the electric typewriter). The problem of having to repetitively strike the "dash" key in order to create a dashed line across the page was not experienced by typists as a problem to be fixed. It remained for the inventor of the repeating key function to show typists (and later users of word processors) that they had this "problem."

As with the brake light invention, the inventor's contribution should be saved for the Summary, as in the "Right Approach" version below.

### **Wrong Approach**

#### **Part of Inventor's Contribution Appears in the Background**

##### *Background*

Typewriting has contributed greatly to the speed and legibility with which words can be put to paper. However, improvements are always desired in any art. For example, when the same character or space is to be typed multiple times, it is inefficient for a typist to have to depress the corresponding key that same number of times.

##### *Summary*

Typewriters embodying the principles of the invention type a character or space continuously for as long as the corresponding key is depressed.

### **Right Approach**

#### **All of Inventor's Contribution in the Summary**

##### *Background*

Typewriting has contributed greatly to the speed and legibility with which words can be put to paper. However, improvements are always desired in any art.

##### *Summary*

I have observed that when the same character or space is to be typed multiple times, it is inefficient for a typist to have to depress the corresponding key that same number of times. Based on this observation, typewriters embodying the principles of the invention type a character or space continuously for as long as the corresponding key is depressed.

The invention is sometimes even given away to the prior art at the very outset of the Background, in its Field of the Invention. In the following example, the italicized words go beyond the field of the invention to disclose the invention itself:

#### **Field of the Invention**

The present invention relates to typewriting and, in particular, to a function of a typewriter *wherein a character or space is repeated for as long as the corresponding key is depressed.*

This is to be avoided for all of the reasons discussed above.

#### **The Summary**

The Summary presents the solution to the problem laid out in the Background.

There are two schools of thought about the Summary.

Many attorneys, including the author, subscribe to the view that the Summary should present the invention in narrative form, thereby continuing the story-telling that was begun in the Background. This is referred to here as the story-telling type of Summary.

The other school of thought holds that the Summary should be a substantially verbatim reprise of the broadest claim, and perhaps other claims, with only minor reformatting or wording changes, such as changing “said” to “the.” This is referred to here as the claim-restatement type of Summary.

Proponents of the claim-restatement type of Summary have litigation in mind. It is felt that a court may rule that one or more embodiment details are essential to the invention because they are mentioned in the Summary. The claimed subject matter is then interpreted as being limited by those details, even when the claims don’t recite them, creating a loophole for the accused infringer. This is avoided if the Summary exactly mimics the claims. Indeed, in at least one reported case, recitations in a “whereby clause,” which are not normally given limiting effect, were deemed to be an integral part of the claimed process at least in part because of language in the Summary.<sup>1</sup>

Unfortunately, the claim-restatement type of Summary usually leaves the reader in the dark as to what the invention is, as in the following example:

#### **Summary of the Invention**

The above problems are solved in one aspect by a vacuum pump having a drivable worm gear comprising a screw thread

made of plastic and being formed as one piece, the worm gear having a first longitudinal section configured for being coupled to a pinion via which a torque can be transmitted from the pinion to the worm gear and the first longitudinal section being formed as one piece with the worm gear and wherein the worm gear comprises first and second support sections, a second longitudinal section and a third longitudinal section and the second and the third longitudinal sections being formed as one piece with the worm gear and the worm gear having a slot for the receipt of an anti-seize-up arm.

This type of Summary invariably leaves the reader with only one reaction—"Huh?"—and squanders a golden opportunity to bring the reading audience on board with the invention. Like the claims that underlie it, a claim-restatement type of Summary *defines* the invention but does not *explain* what it is. Such a Summary does not speak to the patent's intended audience. In fact, it does not speak to anyone. Readers invariably stop reading a claim-restatement type of Summary after the first few lines because it conveys little readily digestible information and is tedious to wade through. One might just as well read the claims themselves. The reader is particularly frustrated with this type of Summary when the Background has done a good job of describing the problem. Having been brought to a point of dramatic tension, the reader wonders "How *are* they going to solve this problem?" only to encounter a lexical brick wall that does not provide an understandable answer.

The advantage of the claim-restatement type of Summary is, moreover, speculative and theoretical. Only a tiny percentage of patents are ever involved in litigation. Even a smaller number are subjected to a claim-narrowing interpretation based on language in the Summary. Furthermore, although claims are usually amended during prosecution, practitioners rarely amend the Summary, and so the Summary in the issued patent does not jibe with the issued claims anyway.

By contrast, many more patents are the subject of licensing negotiations. A Summary that effectively explains what the invention is goes a long way toward showing the would-be licensee that he is not being asked to pay something for nothing. It helps smooth the way toward a successful deal-closing, particularly if a business executive or other non-patent-professional is involved in the negotiations. A story-telling Summary is something he can understand. "Are we doing this?" he may ask his people, "And, if so, why are we fighting this?"

A patent whose Summary makes the invention clear is less likely to get into litigation because the Opposing Team is more likely to agree (at least among themselves) that their product implements the inventor's

teachings. They are also more likely to conclude that the jury will see it that way as well.

A story-telling Summary can even play a positive role in litigation by helping the judge and jury understand what was invented. It is compelling when the Summary is read aloud in court and the patent owner's expert testifies that it describes just what the defendant's product does.

A Summary cannot help but "come out broader" when it is written unconstrained by claim-drafting mechanics and formalisms. Indeed, this is one of the important reasons that the author advocates characterizing the invention in problem-solution form in the first instance, rather than through an invention-analysis-by-claim-drafting approach.

This is not to negate the concern that informs some practitioners' preference for a claim-restatement type of Summary. We certainly do not want claimed subject matter to be limited by embodiment details contained in the Summary but not present in the claim itself. But the claim-restatement type of Summary throws out the baby with the bathwater. One gives up a lot by foregoing the advantages that flow from a well-thought-out Summary in anticipation of a speculative and infrequent litigation contingency.

It is possible, in any event, to address that contingency and still employ the story-telling type of Summary by following the guidelines presented below. As with the discussion of the Background, use of these guidelines is illustrated both by specific examples and by a fictional patent for the invention of the chair as presented in Appendix C.

### **State the Inventive Solution in One Sentence**

Whenever possible, the Summary should contain a one-sentence statement of the invention. It should usually be the Summary's first sentence and is typically lifted right out of the problem-solution statement. Any contextual or terminological antecedents for the solution will have been provided in the Background. This is what allows the solution to be stated in the Summary so directly.

Here are four examples of such Summaries, in which the second sentence closes the problem-solution loop—a desirable feature of the Summary discussed below.

#### **Summary of the Invention**

##### **A.**

In a traffic signal embodying the principles of the invention, the indicia displayed for the first direction of travel are changed

automatically in predetermined coordination with changes in the indicia displayed for the second direction of travel. Such automatic changing of the indicia avoids the inconsistencies that can result when the indicia are changed manually.

B.

In accordance with the invention, the nonuniform heating problem is solved by engendering relative motion between the microwave energy source and the food to be heated. In this way, no one portion of the food is maintained in a region of the oven cavity where standing waves are formed, where they would be heated to a greater degree than other portions.

C.

In accordance with the invention, light pen locations determined during previous scans are used to predict the location of the pen during the upcoming scan and thus to determine where the scanning patch is to be centered on the screen. This technique allows the patch to be made smaller than in the prior art, substantially decreasing the average time required to identify the new pen location.

D.

In accordance with the invention, each display point is energized to have an intensity proportional to the average intensity of a cluster of cells of the dithered image rather than the intensity of a single dithered image cell, as in the prior art. This has the effect of averaging the brightness of each two-line pair which, in turn, eliminates the flicker.

As noted above—and as in these examples—it is usually appropriate for the one-sentence solution to be the Summary's opening sentence. But this is not always the case. For example, when the inventor's contribution to the art includes discovery of something about the problem, or when the inventor has discovered the very existence of the problem or its source, the Summary should begin by explaining that discovery. The one-sentence solution follows that. Examples are the above Summaries for the automobile brake light and repeating key inventions.

Other Summaries that lead off with something other than the one-sentence solution are presented below under the heading *Be Creative*.

### **Present the Solution Functionally**

The inventive solution should be stated as functionally as possible with a minimum of “hardware” limitations. See the examples above. Just as in the problem-solution statement, the Summary should specify *what* is done to solve the problem rather than *how* the embodiment happens to carry it off. Indeed, if a problem-solution statement has been developed following the methodology presented in this book, the “solution” portion of the problem-solution statement will already meet this criterion. Even for something as apparatus-focused as the chair invention, it is still possible to state the solution with a fair amount of functionality, as seen in Appendix C. A Summary that defines the invention principally in apparatus terms is often narrower than it has to be.

### **Close the Problem-Solution Loop**

The Background has laid out a problem, and the Summary presents the solution to that problem. How the solution actually solves the problem is sometimes immediately apparent, but not always so. In the latter case, the story-telling function of the Background and Summary is enhanced when the Summary closes out the problem-solution loop by explicitly stating how the inventive steps or structure solve the problem. See the last sentence of each of the Summaries above.

### **Designate Optional Features as Such**

The Summary can safely refer to the solution portion of the problem-solution statement as “the invention.” At the same time, however, the Summary must make clear that fallback features or other embodiment details that it mentions are only illustrative or optional. There should never be a question about what is absolutely required by the broad invention and what is not.

This is accomplished by appropriate use of appropriate qualifying terms, as in the following examples:

- “If desired, particular embodiments may optionally include step S.”
- “Element E may be, for example, the particular type of E known as an E<sub>1</sub>.”
- “The invention may be used to particular advantage in context C.”

### **Use the “Inverted Pyramid” Style**

The Summary should follow the “inverted pyramid” format used in newspaper stories. The first sentence presents the essential kernel of the

story. Important details appear in the next few paragraphs. Quotes, fill-in information, and less important details come after that. Very little that is unimportant appears ahead of anything more important. Here is an example of such a newspaper story:

FREEDONIA, April 2—An earthquake of monumental proportions struck this island nation today, killing hundreds of people and injuring thousands more. Property damage was estimated at \$900 million.

The quake, which began at 5 A.M. AST, measured 8.5 on the Richter scale. It was the second major earthquake to strike this island nation in five years.

The previous quake measured 7.6. Since the Richter scale is logarithmic, today's event was considerably more powerful.

"We have barely recovered from the last one," Prime Minister Alexander Wagstaff said at a press conference shortly after, "and now this."

Note how the story could be pruned paragraph by paragraph from the end and would still make sense. This is because the paragraphs are self-contained, convey the most important information first, and leave less-important details for later.

The Summary in a patent specification should be similarly constructed. Only what is essential to defining the invention appears in the one-sentence solution. This should be followed by the most important details—the important fallback features, advantageous contexts in which the invention may be implemented, and so forth. Further details, such as less-important fallback features, come after that. See the example in Appendix C.

Any news story always omits some details because they are not significant enough to report. So too when constructing a Summary. There is always a point where further embodiment details, even if included in one or more of the narrower claims, are not sufficiently important to be highlighted in the Summary. The dividing line is arbitrary. There is no particular harm in going "too far" as long as it is made clear that such details are merely illustrative or optional. A useful test is to ask whether a particular detail would be helpful to the first-time reader in understanding the invention or how it can be advantageously implemented.

The author refers to this process for constructing the Summary as pushing the details "down and out." After having presented the one-sentence statement of the invention solution, the next most important detail—for example, the most important fallback feature—is presented next. The next most important detail comes after that. Each other detail

continues to be pushed down further into the pool of as yet unmentioned details until it emerges as the most important of those that remain. At some point, any other embodiment details that *could* be presented are not important enough to *be* presented.

The effectiveness of the inverted pyramid technique in presenting the most important details first can be further appreciated by comparing the earthquake story above with the following alternative version, in which the format is violated in the extreme:

FREEDONIA, April 2—Freedonia Prime Minister Alexander Wagstaff called a press conference at 8 A.M. AST this morning. Mr. Wagstaff reminded the assembled journalists that some five years ago Freedonia was hit by an earthquake measuring 7.6 on the Richter scale. It was only within the last several months, he pointed out, that all damage from that quake had been repaired and all services restored.

It was against that backdrop that Mr. Wagstaff announced a new incident that brought thousands of people to the hospital, and caused at least \$900 million in damage. Hundreds more were killed when, at 5 A.M. AST, Freedonia was hit with another earthquake, measuring 8.5.

## Be Creative

The Summary provides a lot of opportunity for story-telling creativity. In each of the following examples, the Summary does not begin with the one-sentence solution. Rather, it features a lead-in that paves the way for it. We saw earlier how such a lead-in is appropriate when at least a part of the inventor's contribution to the art was the inventor's discovery of the problem or of the source of a known problem. A pre-inventive-concept lead-in can actually serve any number of different functions, as illustrated by the following examples.

### *Lead-in A*

The lead-in presents a key recognition on the part of the inventor as to the desirability of providing a new functionality to an old device.

We have recognized that what is needed in order to solve this problem is to provide each codec in a connection with the ability to recognize the presence of another codec on its high-bit-rate side of the connection. In accordance with the invention, a codec, upon recognizing the presence of another codec on its high-bit-rate side of a connection, switches from its conventional



encoding/decoding operating mode to a mode in which it embeds the coded speech bits in its output signal directly. As a result, only one encoding/decoding cycle is performed across the connection.

#### *Lead-in B*

The lead-in describes how the inventive circuit is similar to the prior art as a way of highlighting the difference between them.

A differential amplifier solving the above problem is similar to prior art differential amplifiers that generate an intermediate differential signal, from which an output signal is normally generated. In accordance with the invention, however, the output differential signal is generated by output circuitry which combines each component of the intermediate differential signal with an auxiliary signal component in phase therewith.

#### *Lead-in C*

The lead-in uses the Summary as the vehicle to mention certain known properties of the material comprising the device, thereby steering clear of presaging the invention in the Background.

At the heart of our micro-positioner is a monolithic body of a crystalline material of a type in which (a) domains of differing crystal axis orientations can coexist stably, (b) domain walls can be moved via applied electrical signals, and (c) domain wall movement results in relative motion between the non-interfacing domain ends. We have recognized that these properties can be exploited to provide a micro-positioner in which an object to be moved is secured to a free end of the crystalline body while the other end is held fixed. Movement of a domain wall via application of an appropriate electrical signal gives rise to the desired micro-movement of the object.

#### *Lead-in D*

The lead-in describes a phenomenon observed in the laboratory that the inventors went on to exploit.

We have discovered that storage of wall voltage can be minimized by using a scan write pulse shaped in such a way that the wall voltage just stored by the pulse can give rise to a so-called "second breakdown" which actually reduces the wall voltage.

This advantageously allows the selection of scan write pulse parameters that are sufficiently large to overcome the above-noted problem of ensuring that the OFF cell flashes without threatening to switch other OFF cells to the ON state. A plasma panel embodying the principles of the invention utilizes just such a scan write pulse.



Having told a concise version of the problem-solution story in the Background and Summary, we are primed to tell it again—but in expanded form—in the Detailed Description. Writing *that* part of the specification is the subject of the next chapter.

### Note

1. *Hoffer v. Microsoft Corp.*, 405 F.3d 1326, 1329, 74 USPQ2d 1481, 1483 (Fed. Cir. 2005).

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## CHAPTER SEVENTEEN

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### Writing the Detailed Description

The Detailed Description, along with its accompanying Drawings, is a second telling of the problem/solution story. Actually, the Detailed Description *illustrates* the story rather than simply telling it.

The Background and Summary of many patents do a good job of telling the invention story. However, the invention often disappears from view once the Detailed Description starts up. The reader is set loose to negotiate an expanse of details without being shown how they relate to the invention story.

A Detailed Description that does not continue to focus on the invention story misses an opportunity to help the reading audience better understand the invention. The fact that “it’s all in there somewhere” only satisfies the minimum legal requirement of enablement.<sup>1</sup> It does not guarantee that the reader will be able to align the broad statements in the Background and Summary with the specifics in the Detailed Description. Most of the details in the Detailed Description (and Drawings) do not illustrate the invention *per se*. Their purpose is to provide an enabling disclosure—showing particular implementations of functional blocks, explaining the overall context in which the invention is implemented, and so forth. Even in a moderately simple Detailed Description it may not be at all clear which aspects of the disclosed embodiment(s) correspond to the elements of the invention unless the correspondence is explicitly pointed out.

The Detailed Description, then, should not be a flat, featureless field of undifferentiated details. It should be an attention-grabbing landscape with a central focus and clearly delineated features that stand out from the overall setting.

#### **The Detailed Description as Expansion of the Background/Summary**

Many attorneys write the Detailed Description before the Background and Summary. There is much to be said, however, for writing the Background and Summary first. Indeed, that is the author’s preferred approach.

A Background and Summary based on the guidelines of the previous chapter serve as a perfect outline for the Detailed Description. The Background and Summary guide the writer as to what should be introduced when in telling the expanded version of the invention story. In fact, the author's Detailed Descriptions typically contain each sentence of the Summary, or sometimes whole paragraphs, augmented or expanded with the embodiment details. Key sentences from the Background are sometimes also included. A Detailed Description written in this way provides its reader with a clear picture of which aspects of the Detailed Description illustrate the broad, general statements made in the Background and Summary. It imbues the overall specification with a pedagogic unity and cohesiveness that is hard to achieve when the Detailed Description is written first.

This approach is used in the sample patent shown in Appendix C.

### **Illustrating the Problem**

The Detailed Description's telling of the problem can be at various levels of detail, depending on what seems useful. The problem story can be as short as a sentence or two that refer the reader to the Background. Often, however, it is useful to illustrate the problem with reference to a block diagram of an illustrative system, or a flowchart of an illustrative prior art process in which the problem arises. If the invention is a simple article of manufacture, such as a hand tool, a piece of sports equipment, or a gadget of some kind, it may be useful to show a prior art version.

The stage is thus set for the problem to be shown in context and to be explained in greater depth than is typically desirable for the Background. As mentioned above, whole sentences appearing in the Background describing the problem may be presented again at this point, and then amplified with reference to the system block diagram or process flowchart. The reader may have understood the problem in a general sense from having read the Background, but may not have understood specifically how the problem arises or why solving it is so important. The Detailed Description is a vehicle through which these things can be made clear.

### **Illustrating the Solution**

The stage is now set for the Detailed Description to illustrate the solution to the problem. The following are some specific ideas for illustrating the solution in a pedagogic way that moves the invention story forward.

#### *Point Out the Inventive Departure*

There will be points in the Detailed Description where the reader will encounter the structural element(s) or method step(s) that constitute the

inventive departure. These should be explicitly pointed out by making specific reference to “the invention.” Such lead-in phrases as “In accordance with the invention” serve well here. Indeed, the first embodiment in the Detailed Description is a place where the Summary’s one-sentence statement of the inventive concept can be inserted and then amplified with specific reference to the embodiment.

#### *Use the Word “Invention” Carefully*

The word “invention” should be used with great care. This is a point that cannot be emphasized often enough or strongly enough. The word “invention” should be used without qualification only when referring to the broad inventive concept. We should not call something “the invention” unless we are willing to have the patent coverage limited to that.

If the specification says that something is “the invention,” the Opposing Team will argue to the Court that it *is* the invention, regardless of what the claims say, and various reported decisions<sup>2</sup> will back them up. Broad terms in the claims have been interpreted narrowly because the specification characterized something as being a part of “the invention.” Indeed, entire claim elements nowhere to be found in a claim have been imported into it based on such a characterization of “the invention” in the specification.

Consider, for example, the seemingly innocuous statement

FIG. 1 is a circuit diagram of the invention.

This sentence implies that every component shown in the diagram is required to implement the inventive concept. It is not likely that that is what the patent drafter meant. Unless one is willing to have the patent’s coverage limited to the circuit exactly as shown, it would be better to write

FIG. 1 is a diagram of a circuit embodying the principles of the invention.

Or consider the statement

The invention employs a nickel oxide shell-type catalyst to speed up the reaction between X and Y.

This statement implies that the invention necessarily involves use of a nickel oxide shell-type catalyst. This is fine if reacting X and Y using a catalyst is known in the prior art and the inventive departure is that the catalyst is of the nickel oxide shell-type. But if the invention resides simply in reacting X with Y, it would be better to write

Particular embodiments of the invention may use a nickel oxide shell-type catalyst to speed up the reaction between X and Y.

These considerations apply, of course, to the Summary as well. Indeed, it is even more important to observe the specialness of the word “invention” in the Summary since the Summary is supposed to be a summary of the invention *per se*.<sup>3</sup> However, the point is brought up here—in connection with the Detailed Description—because we are already quite focused on stating what the invention is when writing the Summary, and so we are not as likely to make a mistake. The Detailed Description is less formalized and more wide-ranging. There is a lot more to think about than just the invention *per se* when drafting the Detailed Description. It may thus be easier to slip up when writing the Detailed Description and refer to something as “the invention” when it is not.

When the claims in a litigated patent get interpreted more narrowly than they “should,” the specification is often the culprit.

### **Use the Inverted Pyramid Style to Get to the Invention Early**

A way to keep up reader interest is to structure the Detailed Description using the inverted pyramid style described above in connection with the Summary.<sup>4</sup> For example, the inventive concept may reside in a new functional relationship between the elements of a known type of system. In such a case the Detailed Description can lead off with a description of a high-level block diagram or simplified mechanical drawing illustrating that functional relationship. The details of the various components of the disclosed system can be introduced later on.

Indeed, it is the author’s practice to push down to the end of the disclosure descriptions of components or steps that are not involved in the invention but are simply included to fulfill the enablement requirement.<sup>5</sup> Few readers will actually be interested in that material, and it can get in the way of the story-telling. An inverted-pyramid-style Detailed Description will, in fact, evolve naturally if the Summary is used as a template.

If the subject matter is not amenable to an early introduction of the inventive concept, we can at least clue the reader in on where a discussion of the invention may be found, as in the following:

In order to explain the invention, this description first presents some tutorial material relating to sonar-based prospecting. The present invention, relating to our technique for processing the sonar data, is described below under the heading “sonar signal processing.”

### **Have the Invention Well in Hand Before Starting the Detailed Description**

The key to writing an effective Detailed Description is to have the invention well in hand *before* the writing begins. This is automatically accomplished if the Summary has already been written, as suggested above. But even if the Detailed Description is written first, we still should know what the invention is before we start.

A contrary view holds that familiarity with the embodiment gained by writing the Detailed Description helps the attorney determine what the invention actually is. We have seen, however, that analyzing the embodiment to identify the invention rather than carrying out a problem-solution analysis can easily result in the broad invention being missed.

Even if the invention does get properly identified at some point during or after the writing of the Detailed Description, the Detailed Description probably will not point out the invention in desirably broad, functional terms. Aspects of the embodiment that were thought to be central to the invention, and described as such, may prove to be only optional fallback features. Conversely, features that were thought to be optional might prove to be crucial to patentability once the invention has been fully analyzed and vetted against the prior art. Terminology used in the Detailed Description may prove to be too narrow in light of what was later realized to be the invention. The overall structure of the Detailed Description may prove to be less than optimally suited for telling and illustrating the invention story.

Revision is always an option, of course, but involves time and effort that would not have to have been expended if the invention had been identified at the outset.

Preparing the drawings is also more efficient if we know what the invention is. Since the drawings must show every feature recited in the claims,<sup>6</sup> we can be sure that the drawings are complete only once we know what the claims will say. This, in turn, requires knowing what the invention is and what its fallback features are. Revising the drawings can be tedious and may entail further revision of the specification to make it consistent with the revised drawings.

There are other issues. Major revision of the Detailed Description is error-prone. The editing process may miss an unduly limiting statement about what “the invention” entails. Not all changes in terminology may be caught. The narrative is likely to read like the patch job that it was. As with any composition, writing the Detailed Description without a clear goal can result in a tangle that is very hard to unravel.

## Be Detailed Where the Invention Lives

How detailed should the Detailed Description actually be?

An effective rule of thumb is *Be Detailed Where the Invention Lives*. This means that aspects of the embodiment that relate most closely to the invention should be described in the greatest detail. Conversely, aspects of the embodiments that are further removed from the invention can be described in less detail.

In the book's chair example, for instance, the approximate height of the seat above the supporting surface—about 18 inches, say—is close to where the invention lives because the invention relates to how the seat is supported, and the height of the seat is determined by the length of the chair's "elongated support members," the latter constituting the inventive departure. On the other hand, methods for felling trees in order to obtain wood to build a chair are far from where the invention lives, and one could feel safe in leaving a discussion of tree-felling methods out of the specification (assuming the prior art knew some way to fell a tree).

Details that are closest to where the invention lives are most likely to be details that can be effectively relied on to distinguish the invention from invention-irrelevant prior art, as will now be explained.

Recall from an earlier discussion<sup>7</sup> that "invention-irrelevant" prior art is prior art that anticipates a claim, rendering it overbroad, but does not disclose the inventive concept and/or does not solve the problem. The words of the claim just happen to read on that prior art.

There is no need to fall back to a narrower view of the invention in such a case by, for example, incorporating one of its fallback features into the broadest claims. Rather, what needs to be done when faced with invention-irrelevant prior art is to add language to the claim that firms up the invention boundaries that were always intended. This is further discussed in Chapter Nineteen.

It becomes clear soon enough what additional language is needed to firm up the intended invention boundaries. Sometimes that language will define a context to which the invention applies or in which the problem arises. Sometimes it is an operational parameter or a relationship between parameters. Sometimes it is an explicit definition for a term that an examiner might interpret more broadly than the claim drafter intended or envisioned. In all these cases, amending the claim to include the additional language does narrow the claim, but only to the extent of reining it in to the subject matter intended to be encompassed in the first place.

Here's the catch: Whatever the additional language is to be, it needs to find support in the specification. Therein lies a dilemma. On the one hand, it is difficult to predict just what additional language might be needed. The nature of the invention-irrelevant prior art that may come



up during prosecution is unpredictable. On the other hand, it is not cost-effective or practical to disclose every minute detail of every element or method step in the embodiment on the off-chance that any particular one of them might hold the key to firming up the invention boundaries in the face of invention-irrelevant prior art. Choices have to be made in order to meet realities of time and budget.

Being detailed where the invention lives is an effective way of making those choices.

Returning to our chair example, the height of the seat above the supporting surface may seem like an irrelevant detail not worthy of mention. If the invention is that the support members are “elongated,” who cares how high they position the seat? This detail could save the day, however, if prior art comes to light after the patent application is filed disclosing a standard-height table. The claim could then be amended to recite the seat height.

The author was once called upon to study an issued patent whose claims referred to a “stripe.” The file history showed that the examiner was able to read the claims on invention-irrelevant prior art by interpreting the term “stripe” very broadly. The prior art’s “stripe” was quite different from what the patent applicant had in mind. It would not have given up any significant invention coverage to amend the claim to include a geometrical definition of the kind of “stripe” that would be appropriate to solve the problem the invention was directed to. Unfortunately, the specification nowhere defined what the inventor meant by “stripe,” so there was no support for such an amendment. Indeed, the file history showed that the attorney had a great deal of trouble getting the patent application allowed.

Adherence to the prescription *Be Detailed Where the Invention Lives* would certainly have helped in that case. A term used in a claim, such as the “stripe” of this example, is not just *close* to where the invention lives. It is at the very *heart* of where the invention lives. Following this prescription would therefore have led the attorney to indicate in the specification the meaning of “stripe” in the context of the invention at hand.

### **Collect Variations and Alternatives as You Go; Save Them for the End**

It is desirable for the Detailed Description to point out ways that the disclosed embodiment can be changed while still carrying out the invention. This includes different environments in which the invention may be used, equivalents for various elements and functional blocks, alternative materials, and so forth, referred to here as “embodiment alternatives.”

Pointing out embodiment alternatives serves at least two functions. One is to help ensure that a broad range of equivalents is accorded to the various claim limitations—including means-plus-function elements.<sup>8</sup>

The other function served by disclosing embodiment alternatives is to put them into the prior art.<sup>9</sup> This forecloses others from later arguing that those alternatives are nonobvious and thereby possibly obtaining patents that cover them.

Many embodiment alternatives may occur to the attorney on his own. Others may be offered up by the inventor. If the attorney is writing the application collaboratively with the inventor, as suggested later in the book,<sup>10</sup> he can urge the inventor to mention embodiment alternatives during the writing process.

The author likes to set up a space at the end of the draft specification where alternatives that come to mind can be quickly noted. That way they won't be forgotten, but attention can stay focused on composing the main story line. Those alternatives can later be integrated into the body of the Detailed Description. Or, they can be cleaned up and retained at the end of the specification along with the other usual "savings language" typically included at the end of the Detailed Description. Too many embodiment alternatives introduced into the main text can get in the way of the story-telling.

### **When Should the Detailed Description Be Written?**

Having identified the invention—and perhaps drafted at least some claims—many attorneys write the Detailed Description next, then the Background, and finally the Summary.

As described above, the author always writes the Background and Summary before writing the Detailed Description. In fact, the author usually writes the sections of the application in their order of presentation: Background, Summary, Detailed Description, and then Claims. This is a methodology that can work only if one has the invention fully in hand and the fallback features have been identified. A nailed-down answer to the question *What is the Invention?* is absolutely required for this approach to work.

Some of the advantages of writing the Background and Summary before the Detailed Description have already been discussed, but there are others.

The process of writing the Background and Summary provides an opportunity to "tweak up" the description of the invention within a compact lexical space. This includes refining our view of the broad invention, establishing a terminology to describe the invention and the environment in which it is going to be disclosed, and establishing a logical flow of

ideas, from the problem to the solution to the fallback features. It is more time-consuming to go back through an extensive Detailed Description and make changes if our view of the invention has changed or if new terminology was introduced in midstream.

Writing the Background and Summary in this way can be painstakingly slow. But it pays for itself many times over. A thoroughly vetted Background and Summary serves as an invaluable guide for writing the Detailed Description, assisting with terminology as well as the logical flow of ideas.

The author writes the claims last. Insights may evolve during the writing of the specification—particularly the Background and Summary. Claims written last benefit from all of that.

### Final Review

Once the Detailed Description and then the claims (if not written previously) have been completed, the specification is in condition for a final attorney review before being sent to the inventor. The following review points apply not only to the Detailed Description, but to the Background and Summary as well.

Important things to check are the following:

- Consider every mention of the word “invention.” If properly used, it should never imply or allow for an inference that the inventor regarded some optional feature as being required for the broad invention.
- Proceed down through the claims and confirm that every term, functional recitation, and concept in the claims has a clear antecedent basis in the specification and that every claim term is well defined. (This would have saved one attorney a lot of grief in the case of the claim term “stripe” recounted above.)
- Confirm that the Summary’s definition of the invention aligns with the broadest claim(s). Any limitations in the Summary that are not in the broadest claims should be qualified as being “illustrative” or “optional” and/or pushed down into a later part of the Summary. The Summary in its final form should conform to the claims in *their* final form.
- Tend to editorial and administrative matters. Is the terminology used in the specification consistent throughout? Does the specification mention every element in the drawing that was given a reference numeral? Are spelling, grammar, and punctuation correct?

The application can then go to the inventor for her final review.



The activities involved in securing patent protection for an invention—preparing the patent application and then prosecuting it in the Patent and Trademark Office—are colloquially referred to as “prep and pros.” To this point in the book, we’ve addressed “prep.” We will return to it in Chapter Twenty when we discuss working with the inventor.

The upcoming two chapters focus on “pros.” They address the topic of claim rejections and how the problem-solution paradigm is brought to bear when amending claims.

### Notes

1. 35 U.S.C. 112, ¶ 1.
2. See, for example, *Curtiss-Wright Flow Control Corp. v. Velan, Inc.*, 438 F.3d 1374, 77 USPQ2d 1998 (Fed Cir. 2006)
3. MANUAL OF PATENT EXAMINING PROCEDURE, § 608.01(d) (8th ed., rev. 2, May 2004).
4. See pp. 204–206.
5. 35 U.S.C. 112, ¶ 1.
6. 37 C.F.R. 1.83.
7. See p. 115–118.
8. “An element . . . expressed as a means or step for performing a specified function . . . shall be construed to cover the corresponding structure, material, or acts described in the specification *and equivalents thereof*.” 35 U.S.C. 112, ¶ 6 (emphasis added).
9. The effective date of subject matter disclosed in an issued patent or published patent application is the filing date. 35 U.S.C. 102(e).
10. See pp. 246–248.

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## CHAPTER EIGHTEEN

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### Claim Rejections—Amend or Argue?

The problem-solution paradigm is central not only to claiming the invention in the first instance, but also to amending the claims during prosecution, should that prove necessary.

This chapter presents an overview of the six main options available when a claim is rejected as unpatentable under § 102 or § 103. The next chapter describes how the problem-solution paradigm is used to identify the best way(s) to amend a claim, should amending prove to be the appropriate option.

In both chapters, the term “cited prior art” includes both (a) subject matter disclosed in a single prior art reference and cited in a § 102 rejection and (b) subject matter that results from modifying or combining teachings in one or more references as advanced by the examiner in a § 103 rejection.

#### Four Questions, Six Options

The answers to four questions determine which of six options should be taken when a claim is rejected under § 102 or § 103. The four questions are

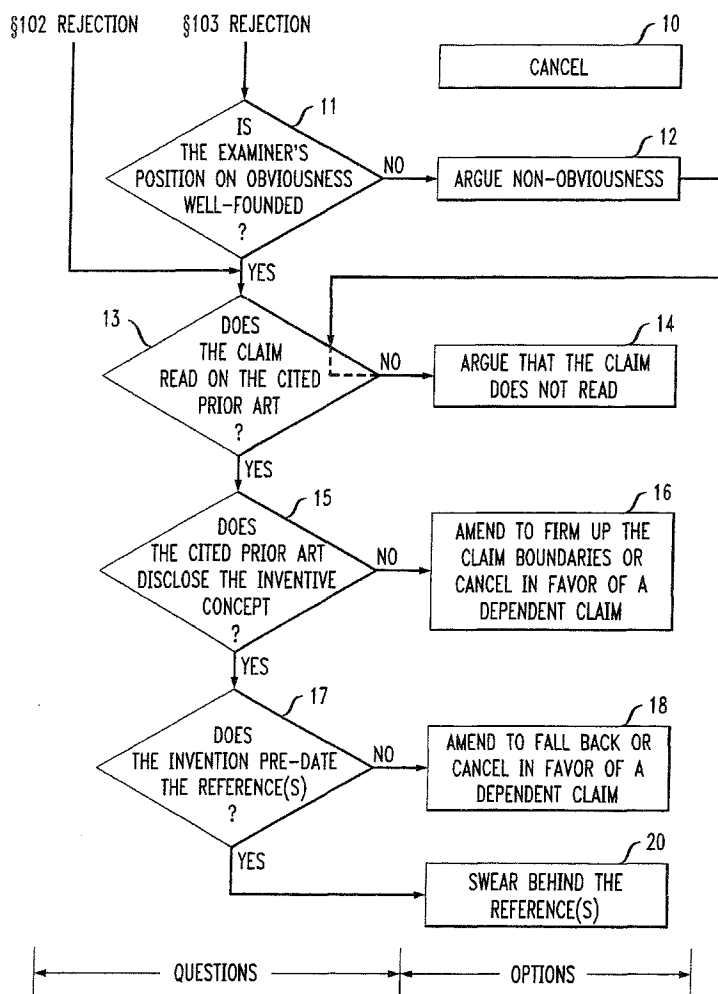
1. Is the examiner’s position on obviousness well founded? (§ 103 rejections only)
2. Does the claim read on the cited prior art?
3. Is the cited prior art the same subject matter intended to be captured by the claim (i.e., does it disclose the inventive concept)?
4. Does the invention predate the cited prior art reference(s)?

And the six options are

1. Argue the nonobviousness of combining or modifying prior art teachings used to reject the claim (§ 103 rejections only).
2. Argue that the rejected claim does not read on the cited prior art.
3. Avoid the cited prior art by amending the claim to retreat from the invention boundaries previously intended to be staked out.

4. Avoid the cited prior art by amending the claim to better define the intended invention boundaries.
5. "Swear behind" the cited prior art reference(s).
6. Cancel the claim.

The flow diagram of Figure 18-1 shows how the options are chosen based on the answers to the four questions. The flow diagram also shows that the option to cancel a claim (box 10) can be pursued independent of the answers to any of the four questions—that is, irrespective of the merits of the rejection. For example, a claim may be deemed expendable



**FIGURE 18-1** Decision process for rejected claims

because other, allowed claims afford adequate coverage for the invention. Or the client may not wish to incur the cost of fighting the rejection. Of course, a claim may also be canceled because the cited prior art renders it unpatentable. This is accounted for elsewhere in the flow diagram (boxes 16 and 18).

It is assumed in this discussion that the effective date of a reference is early enough to render it properly citable against the invention.<sup>1</sup> This is something to be checked, although examiners rarely make such a mistake.

### **Question 1: Is the Examiner's Position on Obviousness Well Founded? (Boxes 11, 12)**

The examiner rejects a claim under § 103 when his opinion is that the claim reads on obvious subject matter, that is, subject matter that would have been obvious to a person of ordinary skill in the art at the time the invention was made. This can be an allegedly obvious modification to the teachings in a single prior art reference or an allegedly obvious combination of the teachings of two or more references.

The threshold consideration when faced with a § 103 rejection is whether the examiner's position on obviousness is well founded. It may not be. For example, the prior art may "teach away" from making the asserted modification or combination of references. Or it may arguably be the product of hindsight, given the benefits of our inventor's disclosure.

It is beyond the scope of this book to delve into the law of obviousness. The reader may wish to consult a general patent law treatise for an in-depth discussion of this area of the law. Suffice it to say that if there is a basis for arguing the nonobviousness of the cited modification/combination, that is the option to take. There is usually no reason to narrow a claim to avoid reading on subject matter that we can argue is nonobvious—not, at least, until after we have attempted to convince the examiner that his position on obviousness is not well founded.

### **Question 2: Does the Claim Read on the Cited Prior Art? (Boxes 13, 14)**

The examiner's position that the claim reads on the prior art needs to be evaluated. Claims are often rejected even though the cited prior art does not meet every claim limitation.

If the claim does not read on the cited prior art, we should argue against the rejection on that basis. An argument should be made even if we have argued against the obviousness of a modification/combination of references advanced by the examiner in a § 103 rejection. That is, we can argue that even if the cited prior art were obvious, the claim still doesn't read on it.

### Try to See It the Examiner's Way

In assessing whether a claim reads on cited prior art, it is important to read the claim and the prior art from the examiner's perspective. The examiner is not required to interpret a claim term narrowly based on what is disclosed in the specification. In fact, he is duty-bound to give claim language its broadest reasonable meaning.<sup>2</sup>

For example, computer scientists use the term "active database" to mean a database that takes an action when a particular event happens. An active database operated by a stock brokerage firm, for example, may be programmed to send an e-mail message to client A when stock B reaches a certain price level. However, the examiner may choose to read "active database" on any database that is "up and running." It is not unreasonable to say that such a database is "active," as opposed to dormant or unresponsive.

There is an exception. If the specification explicitly defines a term, then the examiner is supposed to accord it the narrow meaning provided in the definition, for example:

The term "active database" as used in this specification and claims means a database that takes an action when a particular event happens.

Specifications rarely include such statements, however, and for good reason. The definition may exclude something we will want the claim to cover after the patent issues.

It is usually futile, therefore, to argue for a narrower reading of a claim if the examiner's way of reading it has any merit. More importantly, if an examiner can make all of the words of the claim congruent with something irrelevant to the invention, then something fundamental to the inventive concept is probably missing. As such, the claim is susceptible to being read on a whole raft of other invention-irrelevant prior art that might not turn up until after the patent has issued. This is an opportunity for the attorney to ask himself, "How did I manage to write a claim that covers something not the invention?" and to fix the claim so that it no longer does so.

Of course, we should fight for a claim in its unamended form if a rejection is not well founded. But it is just as important to recognize when it's time to stop, rethink, and amend rather than argue.

### Don't Read Too Much into the Reference(s)

We should be wary of reading too much into a reference by bringing our knowledge of the invention to the reading. A reference may seem to be



describing the inventive subject matter, but a careful reading may reveal otherwise.

The author once supervised a prosecution where the invention related to a facsimile machine that would detect that it was almost out of paper and would thereupon generate a paper order form containing the facsimile telephone number of the company's paper supplier. A user could then simply fill out the order form while still at the fax machine and fax it to the supplier, without having to look up the supplier's facsimile number or search for a blank order form.

The cited prior art was the following translated abstract of a Japanese patent:

A facsimile machine detects an out-of-paper condition and, in response, outputs, either on a screen or on paper, ordering information including the telephone number of the paper vendor.

The attorney handling the prosecution recommended that the application be abandoned based on this abstract. But his knowledge of the invention caused him to read too much into the prior art disclosure. The full translation was ordered, and it revealed that the prior art fax machine did not output an order form but only the paper supplier's telephone number—an arguably nonobvious distinction.

### **Don't Rely Exclusively on the Inventor's Reading of the References**

The inventor's opinion as to what the cited prior art reference(s) teach can be invaluable. But we should not rely on the inventor's reading exclusively. Inventors tend to focus on the broad outlines of a prior art disclosure. They sometimes don't find, or appreciate the significance of, out-of-the-way statements buried in a patent specification that may anticipate the claimed subject matter. Sometimes they will assert that "it's not the same thing" because the prior art is directed to a different problem, even though the prior art's solution inherently solves the problem that the inventor sought to solve. It is therefore important that the attorney also review the reference.

### **Question 3: Does the Cited Prior Art Disclose the Inventive Concept? (Boxes 15, 16, 18)**

Even though a rejected claim reads on the cited prior art, it may be invention-irrelevant prior art. Our next topic of inquiry, then, is "Does the cited prior art disclose the inventive concept?"

If the answer is yes, we will have to swear behind the cited prior art (if we can) if we want to pursue the claim in its present form. This option is further discussed in the next section.

Otherwise, we will have to amend the claim, or, equivalently, to cancel it in favor of a dependent claim that recites the limitations we would have added by amendment. The discussion here assumes that we will amend.

The *strategy* we use in deciding how to amend a claim, however, depends on whether or not the cited prior art discloses the inventive concept.

For example, suppose the inventive concept is mounting a building or other large structure on springs to dampen earthquake vibrations and thereby protect the structure from damage or collapse. The patent application contains the following broad claim to that concept:

18.1 Apparatus comprising  
a structure, and  
one or more springs supporting the structure.

If the examiner finds prior art disclosing the inventive concept, claim 18.1 must be amended to retreat from the invention boundaries originally staked out. The inventor and the attorney thought that the naked notion of mounting structures prone to earthquake damage on springs was new, but that turned out not to be so. Patentability will have to be predicated on at least one fallback feature, such as a unique type of spring that the inventor may have devised for this particular use.

But even if the examiner does not find prior art disclosing the inventive concept, he would still reject claim 18.1 because it reads not only on earthquake-protected buildings but also on pogo sticks, bathroom scales, vibration-damped machinery, and all kinds of other spring-mounted “structures” known in the prior art. Here, however, there is no need to retreat to a narrower view of the invention—to fall back—by adding limitations related to embodiment details. Rather, the claim should be amended to more precisely define what was always intended by the term “structure”—buildings and other structures prone to earthquake damage—thereby preserving coverage for the inventive concept at its full breadth while excluding “invention-irrelevant” prior art like pogo sticks and bathroom scales.

There is a process for determining just what limitations should be added to a claim in either situation. It involves the same problem-solution paradigm that we used in drafting the claim in the first instance. We will see later in this chapter how our claim describing a spring-mounted

building is to be amended in accordance with those principles, depending on what kind of prior art shows up.

#### **Question 4: Does the Invention Predate the Reference(s)? (Boxes 17, 20)**

Pursuant to PTO Rule of Practice 131,<sup>3</sup> a reference is not citable against an invention if the invention predates the reference. “Predates the reference” means that prior to the effective date of the reference, the inventor (a) conceived the claimed subject matter and (b) either reduced the invention to practice or was diligent toward that end. Procedurally, the inventor’s dates of conception and reduction to practice are presented in a so-called Rule 131 affidavit or declaration. The process is referred to as “swearing behind” the reference. This procedure is not available, however, if the rejection is based on a statutory bar under 35 U.S.C. 102(b).

The best practice is to use this option only as a last resort, when no option other than narrowing or canceling the claim is available. As shown in Figure 18-1, then, all of the following should apply before we consider swearing behind a reference:

- (a) We have no argument to make for nonobviousness; *and*
- (b) The claim reads on the cited prior art; *and*
- (c) The cited prior art is invention-relevant.

Stated in the negative, it is the best practice *not* to swear behind a reference if the cited prior art

- (a) Is arguably nonobvious; *or*
- (b) Does not anticipate the claim; *or*
- (c) Is not invention-relevant.

We should thus swear behind a reference (assuming the relevant dates allow us to do so) only when a reference or an obvious modification or combination of reference(s) discloses the inventive concept.

There are several reasons for this.

Prior art similar or identical to the cited prior art—but too early to swear behind—may show up after the patent issues. By having sworn behind the cited prior art rather than arguing against it, we will have passed up an opportunity to establish on the record that the examiner changed his mind and agreed with us that the cited prior art was not obvious or that the claims did not read on it. This can only help strengthen the presumption of validity<sup>4</sup> vis-à-vis similar but too-early-to-swear-behind prior art that may show up downstream.

One might think to take a belt-and-suspenders approach, both arguing against rejection on the merits and swearing behind the prior art. But then it will not be clear on the record that the examiner accepted our substantive arguments, as opposed to having simply accepted the Rule 131 affidavit. Indeed, the Opposing Team will argue to the court that the latter was the case. If our arguments on the merits are ultimately unsuccessful, we can consider filing a Rule 131 affidavit at *that* time.

Moreover, a claim reading on invention-irrelevant prior art—that is, prior art that does not disclose the inventive concept—has probably missed the essence of the invention. Such a claim is always in danger of reading on other prior art that is also invention-irrelevant but is too early to swear behind. Thus by simply swearing behind the cited invention-irrelevant prior art, we pass up the opportunity to improve the claim and, hopefully, get around invention-irrelevant prior art that may turn up only after the patent has issued, when there is little or nothing that can be done about it.



Assuming that we've decided to amend a claim per boxes 16 and 18 of Figure 18-1, we need to decide *how* to amend it. That second part of the story is addressed in the next chapter.

### Notes

1. See, *e.g.*, 35 U.S.C. 102 (a), (b), (e).
2. See, *e.g.*, *In re Morris*, *supra*, and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970). But see *In re Donaldson*, 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994) (en banc), (specification sets a limit on how broadly the Patent and Trademark Office may construe means-plus-function language under the rubric of reasonable interpretation).
3. *Id.*
4. See, *e.g.*, *Central Soya Co. v. Geo. A. Hormel & Co.*, 723 F.2d 1573, 220 USPQ 490 (Fed. Cir. 1983); *Hewlett-Packard Co. v. Bausch & Lomb, Inc.*, 909 F.2d 1464, 15 USPQ2d 1525 (Fed. Cir. 1990).

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## CHAPTER NINETEEN

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### Claim Amendments

This chapter is of a piece with the one preceding. It describes the role of the problem-solution paradigm in deciding how to amend a rejected claim, should that prove to be the desirable option, per boxes 16 and 18 of Figure 18-1 (p. 220).

#### **Rethink the Invention; *Then* Rethink the Claim**

The final form of a claim should not depend on when the prior art that shaped it comes to light. But the reality is sometimes different.

When drafting a claim initially, we may deem it “done” only to realize that it still reads on some piece of prior art we thought we were avoiding. Or a supervisor or colleague reviewing the claim may point out that it reads on prior art we weren’t even aware of.

Returning to the word processor to further rework the claim, we may discover that avoiding that last piece of prior art may be no simple matter. As new limitations are added to deal with the new piece of art, others may be able to be taken out or the context may be redefined—all to make the claim as broad as possible without reading on any prior art, including that last new piece. Everything in the claim is up for grabs until the day the application is sent over to the inventor for signature.

However, once the patent application is filed, a different mind-set seems to take over and the claim and its limitations take on a sacrosanct quality. So when examiner-cited prior art makes amending the claim necessary, our tendency is to “bandage” the claim by simply engrafting some new limitation onto what’s already there. This can result in the claim we would have arrived at had we known about the cited prior art *ab initio*. Often, however, it does not, and the resulting claim defines the invention suboptimally, conceding more than it needs to.

This is not how it should be. It’s the same invention. It’s the same prior art. And so the way we define the invention in view of that prior art should not depend on when the prior art comes to light.

The antidote to all of this is not simply to rethink the *claim*. We should first rethink the *invention* and only then rethink the claim.

## **Amending When Prior Art Does *Not* Disclose the Inventive Concept**

We first consider the case of invention-irrelevant prior art, that is, prior art that does not disclose the inventive concept (Figure 18-1, box 16). A claim can always be amended to include *some* distinguishing limitation. But unless that limitation is arrived at in a principled way, it may be the *wrong* limitation. A “wrong” limitation, while overcoming the cited prior art, may give up more intellectual property than it has to. Or it may leave the claim vulnerable to other invention-irrelevant prior art that may turn up only after the patent has issued, when there is little, if anything, that can be done about it.

Let us return to the concept of spring-mounted buildings for earthquake protection presented in the previous chapter.<sup>1</sup> Assume that the examiner did not find prior art disclosing that concept. He has, however, rejected claim 18.1 (repeated here for convenience as claim 19.1) as reading on certain invention-irrelevant prior art—namely pogo sticks, bathroom scales, and spring-mounted machinery.

**19.1 Apparatus comprising  
a structure, and  
one or more springs supporting the structure.**

An embodiment-based approach to amending this claim could be to observe that buildings contain floors and windows—something that pogo sticks, bathroom scales or spring-mounted machinery do not have—and to use that as the hook for patentability:

**19.2 Apparatus comprising  
a structure of a type that has floors and windows, and  
one or more springs supporting the structure.**

The approach sounds plausible until we think about freestanding towers and other large structures that have no floors or windows and yet might benefit from being spring-mounted.

Nor would it be appropriate to add a fallback-feature-type limitation, such as details of a particular type of spring the inventor has devised for this use. Since the prior art does not disclose the inventive concept, there is no reason to retreat from it by invoking a fallback feature. Rather, we want to contract the scope of the claim *only* to the point of bringing the claimed invention boundaries into line with the boundaries that were always intended—boundaries that do not encompass invention-irrelevant prior art like pogo sticks and bathroom scales.

A problem-solution analysis readily yields the right claim language. The problem the invention solves is that certain kinds of structures are prone to damage or collapse from earthquake vibrations. Pogo sticks, bathroom scales, and (let us assume) machinery do not have that problem. Amending the claim to put the invention into the context in which the problem arises firms up the invention boundaries to encompass what was always intended, while avoiding the cited invention-irrelevant prior art:

**19.3 Apparatus comprising  
a structure of a type that is damaged by earthquake vibrations, and  
one or more springs supporting the structure.**

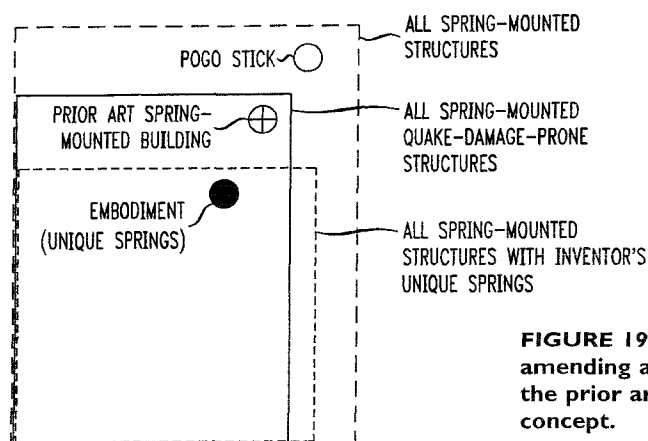
Figure 19-1 shows graphically how this amendment redefines the invention boundaries to avoid the pogo stick (and similar) prior art.

The same claim results from a more formal approach based on this problem-solution statement:

The problem of how to prevent a structure from damage due to earthquake vibrations is solved by supporting the structure on one or more springs.

There may be other ways of amending claim 19.1 to define structures prone to earthquake damage. For example, amending the claim to replace “structure” with “building” might suffice, at least if the specification were to have explicitly defined “building” to include other earthquake-prone structures like freestanding towers.

Definition claims<sup>2</sup> already in the application may well contain the limitations needed to fix a claim rejected on invention-irrelevant prior art.



**FIGURE 19-1** The strategy for amending a claim depends on whether the prior art discloses the inventive concept.

So our earthquake-damage-protection patent application may already have included a definition claim such as the following:

**19.4 The apparatus of claim 19.1 wherein said structure is a type of structure that is damaged by earthquake vibrations.**

Indeed, one of the main functions of definition claims is to anticipate the possibility that invention-irrelevant prior art may show up during prosecution or after the patent has issued.

Otherwise, as in the example above, we will have to rethink the problem-solution with the newly cited prior art in mind and come up with a fix that firms up the invention boundaries without retreating from what the invention boundaries were always intended to be.

### **Amending When Cited Prior Art *Does* Disclose the Inventive Concept**

If the cited prior art *does* disclose the inventive concept, clarifying the intended invention boundaries isn't an option; the intended boundaries actually encompass the prior art.

We need to swear behind the reference if the dates of invention allow for it (Figure 18-1, box 20). Otherwise we need to fall back, retreating from the boundaries previously envisioned for the invention (box 18).

This is the very scenario for which we developed our Planned Retreat for the invention.<sup>3</sup> Thus the current claim suite and the Planned Retreat that it implements can be looked to to supply limitation(s) to overcome the cited prior art. It will be worthwhile, however, to rethink our plan of retreat since in prosecution we still have the opportunity to do so. New insights or changes in the commercial picture may change what we think are the most important fallback feature(s). Indeed, something that may not have been seen as being a meaningful fallback feature when the patent application was first filed may now emerge as being so.

Figure 19-1 depicts the retreat to a fallback position based on the unique building-support springs devised by the inventor.

### **Dropping Limitations No Longer Needed**

Amending claims must be done thoughtfully. A limitation added to a claim to differentiate the invention from the newly cited prior art may distinguish the invention from *all* the prior art, including prior art that shaped the claim originally. As a result, limitation(s) previously thought to be crucial to patentability may now serve only to limit the invention definition unduly. Claiming the invention at its full breadth may thus mean dropping certain limitations at the same time we are adding new ones, as a problem-solution analysis will quickly reveal.



Assume as our example that our client was the inventor of laser-read bar codes. The closest prior art we knew about at the time of filing was the use of magnetic ink to print account numbers and other information on bank checks. This approach is perfectly serviceable for the bank check context because the check layout is uniform, prescribed, and the checks are read in a controlled environment ensuring that the magnetically encoded information is perfectly aligned, and in direct physical contact, with the magnetic read head.

On the other hand, the requirements of coded-object uniformity and controlled physical contact between the object and the code detection apparatus are major problems in a point-of-sale application. Indeed, any one of these problems is a show-stopper for the use of magnetic ink labels for point-of-sale checkout. Our inventor's solution—using laser or other light reflected from a bar code—overcomes all of those problems. Indeed, the broadest claim in the patent application as filed recited reflected light as the hook for patentability:

19.5 A method comprising, identifying an object by machine-reading light reflected from an identifying code on the object.

Assume, however, the examiner finds prior art in which coded patterns are affixed to freight cars and are machine-read by a trackside-mounted photocell that reads light reflected from the coded patterns as the freight cars pass by. That prior art renders claim 19.5 too broad, and we need to amend.

Rethinking the solution, we realize that we could limit the claim to laser light. We reject that approach, however, because it is probably obvious to use a laser in the prior art freight car system. Rethinking the *problem*, however, opens the door to a fix that still retains a great deal of commercially valuable subject matter. Redefining the problem as being how to achieve quick and accurate checkout of a retail product leads us to a limitation that retains the solution at its full breadth but puts that solution into the narrower, retail context.

19.5 (Amended) A method comprising, identifying ~~an object~~ a retail product by machine-reading light reflected from an identifying code on the ~~object~~ retail product.

19.6 A method comprising, identifying a retail product by machine-reading light reflected from an identifying code on the retail product.

A freight car is not a retail product. And we will argue that the freight car prior art would not have rendered it obvious to place machine-readable codes on retail products.

Claim 19.6 is not optimal, however. The reflected-light limitation was a good hook for patentability when the only known prior art was magnetic ink encoding. But once the freight car prior art surfaced, the reflected-light limitation does nothing for the claim except to narrow it unduly and needs to be dropped. Indeed, it appears that the day will come when bar codes on groceries and other consumer goods will be replaced by radio-interrogatable printed electronics<sup>4</sup>—an embodiment that would not be captured by claim 19.6. The same retail-product limitation that distinguishes the invention from the freight car prior art also distinguishes the invention from the bank check prior art, rendering the reflected-light limitation no longer needed.

The better way to amend claim 19.5, then, would have been to remove the reflected-light limitation at the same time that the retail-product limitation was added:

19.5 (Amended) A method comprising, identifying ~~an object~~ a retail product by machine-reading ~~light reflected from~~ an identifying code on the ~~object~~ retail product.

19.7 A method comprising, identifying a retail product by machine-reading an identifying code on the retail product.

A problem-solution analysis undertaken with the freight car prior art in mind will, in fact, readily yield the broader claim 19.7. It is true that having decided to use the retail product angle as the hook for patentability, we might have arrived at a problem-solution statement that initially *included* the reflected light limitation:

The problem of being able to automatically identify a retail product is solved by machine-reading light reflected from an identifying code on the retail product.

However, upon trying this problem-solution statement on for size—questioning the necessity of each limitation—we would have seen that the reflected-light limitation could be eliminated while still not reading on the prior art:

The problem of being able to automatically identify a retail product is solved by machine-reading ~~light reflected from~~ an identifying code on the retail product.

This problem-solution statement yields claim 19.7 straightaway.

The formalism of drafting a new problem-solution statement may not be needed in a simple case. The key is to evaluate each limitation in the claim to be sure that it is still necessary once a new limitation is added. In a more complicated case, however, redrafting the problem-solution statement in light of all the prior art can help us pinpoint limitations that are no longer needed. The new problem-solution statement may occasionally yield a claim that is so different from the one rejected that it may prove cleaner to completely cancel the pending claim in favor of the new one.

One caveat is in order: There is some risk in removing an existing claim limitation, particularly if another attorney wrote the claim. That attorney may have had some particular prior art in mind that requires the limitation's continuing presence in the claim. Even though such prior art should have been cited to the examiner and should be found within the file, the next attorney picking up the case may not appreciate its applicability to the claim. And if the prior art was invention-irrelevant, it might not have been cited at all if it was far afield.

On the other hand, we *do* want to claim the invention at what appears to be its broadest allowable scope. The conservative approach is to do both: narrow the existing claim without eliminating any existing limitations (as in claim 19.6) but also present a new claim based on the new problem-solution analysis (as in claim 19.7).



A patent attorney can usually prepare a patent application with relatively little inventor involvement. However, there are many benefits to working with the inventor to the greatest extent possible, both in identifying the invention and preparing the patent application.

That aspect of the practice is discussed next.

## Notes

1. See p. 224.
2. See Chapter Ten, pp. 115–121.
3. See Chapter Six, pp. 53–64.
4. Alfred Siew, "RFID Spells Convenience for All," *COMPUTERTIMES*, Sept. 22, 2004.



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## CHAPTER TWENTY

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### Working with the Inventor

The inventor is the patent attorney's single most valuable invention analysis resource. This chapter presents a methodology called "self-directed learning" that helps us make the best possible use of that resource in learning about the invention and formulating the problem-solution statement.

The inventor's participation in the process of preparing the patent application itself can also be invaluable. A four-stage collaborative process for working with the inventor to prepare the application is presented.

#### **The Limitations of Classroom-Style Learning**

Unless guided by some other *modus operandi*, a patent attorney and his inventor will typically gravitate to the classroom-style model of information delivery we all grew up with. The inventor (teacher) determines what information will be presented, in what order, and at what level of detail. Yellow pad and pen at the ready, the attorney (student) dutifully takes down the information the inventor has determined he needs to know, in the order the inventor has decided to present it, and at the level of detail the inventor thinks will be useful.

This may all seem appropriate. The inventor has come up with something new, and the attorney needs to learn about it. How better to do that than to enlist the inventor as technology teacher? The attorney is an empty vessel waiting to be filled and the lecture begins.

The classroom model is not, however, the best learning paradigm for patent work. The attorney has specific tasks to accomplish, the most central of these early on being to identify the problem the inventor set out to solve and how she solved it. The attorney must also gather details about the embodiments. But this is a task for later, and even then only at a level sufficient to satisfy the requirements of "enablement" and "best mode."<sup>1</sup>

Unless the inventor has worked on prior patent applications or comes to the problem-solution paradigm intuitively, she has none of this in

mind. For example, the inventor may not offer any information about the problem or the broad solution unless prompted to do so. Moreover, details may be presented by the inventor at too early a stage for the attorney to appreciate their significance or to see how they fit into the overall picture. Invariably this means the inventor will be asked to repeat those details later. This is not necessarily a concern if the invention is simple and the “detail load” is small. However, many high-tech inventions involve a great deal of complex information. While some inventors are quite patient, others become *impatient* with having to re-explain large chunks of information. Repetition wastes the attorney’s time as well.

In short, an attorney making the open-ended request, “Tell me about your invention,” and then settling in to a classroom-style learning session runs the risk of receiving the wrong type of information, or receiving too much information, or receiving it in a less than optimum order.

### Self-Directed Learning

Many attorneys eventually come around to the more efficient inventor interview strategy that the author calls “self-directed learning.” Here, the patent attorney *teaches himself* what he needs to learn, using the inventor as a resource. The attorney takes charge of the conversation rather than being the passive, classroom-style recipient of whatever the inventor thinks to tell him. The attorney controls the quantity of technological information delivered by the inventor, as well as the order and speed of its delivery. Information is thereby received from the inventor at a level of detail, in an order, and at a pace that most efficiently provides the attorney with what he needs to know.

Self-directed learning is analogous to a well-managed courtroom examination. An effective trial attorney stays in control of the witness, asking pointed questions that elicit answers in small bites. He does not let a confusing answer pass by but, rather, follows up with questions aimed at securing a clearer answer.

Another analogy is that of an expedition in a search for the inventive concept. In this paradigm, the inventor and attorney alternate between being the guide and the guided. The inventor is the guide as to the technological landscape, supplying technological information about what she has invented and the prior art that she knows. The attorney is the guide as to the process by which the inventor/attorney team can bring that information to the attorney’s understanding and thereafter analyze it to draw out the inventive concept.

The attorney should take the lead at the outset, giving the broad outline of what needs to be accomplished. He must then cede his role as

expedition leader to the inventor, so that the technological facts can begin to unfold. But the attorney should be ready to jump in and redirect the course of the discussion if it begins to veer off course. This back-and-forth interaction actually repeats itself in three main phases coinciding with the general outline of a patent. The first is the Background phase, in which the inventor is encouraged to talk about the problem she set out to solve. Then the overview or Summary of the Invention phase where the inventive concept and the fallback features are discussed. The third, Detailed Description, phase focuses on teaching the public how to practice the invention. At the outset of each of these phases, the attorney is the teacher and the inventor is the student. However, in order to complete the mosaic, the roles are reversed.

### **Begin from a Known Starting Place**

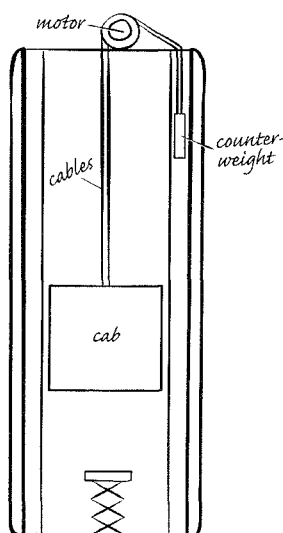
Every patent attorney has had formal technical training or experience. He therefore comes to any invention discussion with at least some technological foundation. The breadth and depth of that foundation will, of course, vary. An attorney experienced in patenting analgesics brings to the analysis of a new analgesic compound a richer fund of knowledge than does an attorney whose pharmaceutical experience has been in vaccines. The latter, in turn, is better prepared to discuss analgesics than is an attorney with no pharmaceutical experience whatever.

No matter what the attorney's level of expertise, however, the process to be used in proceeding from problem to solution, and in gathering the details needed to prepare the written disclosure, is essentially the same. It is a process that enables the attorney to establish and maintain control over the flow of information no matter how much or how little he initially knows about the technology in question.

The process is grounded in the prescription *Begin from a Known Starting Place*. The "known starting place" is the body of knowledge relevant to the invention that the attorney brings to his initial meeting with the inventor. The key is to impart to the inventor at the outset an understanding of what the attorney knows about the subject matter at hand. It may be a lot or a little, but what matters is that a well-defined jumping-off point for the discussion is established.

For example, an initial meeting with an engineer who has made an improvement in elevator counterweighting might start out as follows:

Ben, I can see from your invention disclosure write-up that you have an improved counterweighting system for elevators. Compared to people like you, I am in kindergarten. Let me tell you what I *do* know and we can proceed from there.



**FIGURE 20-1**  
Patent attorney's  
view of how  
elevators work.

Picking up his pencil at this point, the attorney continues, while sketching the drawing of Figure 20-1:

I know that the cab rides up and down on rails, and there's a cable which goes over and around a motor-driven pulley system and then down the side of the elevator shaft. There's a counterweight at the end of the cable, and it weighs about the same as the cab, so the motor-and-pulley combination needs to have only enough power and mechanical advantage to deal with the difference in weight between the cab and the counterweight and to counteract inertia, to start it and stop it. There are enough cables to provide a large margin of safety.

Let's start from there, beginning with the problem you set out to solve. What else should I know in order to understand the problem?

This attorney doesn't know much about elevators or their counterweights. But it is better for the inventor to know at the outset just what it is that the attorney does and doesn't know.

On the other hand, the attorney may know the technology intimately, so that his known starting place is at a more advanced level. The initial discussion can then be more narrowly focused on the specifics of the problem and solution.

Beginning from a known starting place is a powerful way of jump-starting the learning process. The attorney's initial exposition of what he knows about the technology establishes his role as discussion leader. It also acclimates the inventor to the attorney's level of familiarity with the technology and establishes common terminology. The inventor can tailor his information to the attorney's level of understanding. And since the inventor will supply information based on what the attorney has already laid out, each increment of information can be placed in the attorney's mind within a well-understood framework.

### Proceed Slowly and Carefully

Think about how a tree increases its girth over time by adding successive layers of wood to the existing trunk. Or how an oyster, beginning with a



grain of sand, continuously deposits tiny amounts of calcium carbonate around the grain of sand to create a pearl. These natural world processes build slowly on an initial core, consolidating the new material with the old without leaving significant holes or gaps in the new structure.

The same is true of an attorney expanding his core of knowledge about an invention. He needs to begin from what he knows and then proceed slowly and carefully—eliciting information in small steps and consolidating the new information with the old.

The order in which the information is elicited from the inventor is also important to efficiently gain an understanding of the invention story—first, enough prior art to understand the problem, then the problem itself, then the broad solution, then the implementational features. Early on, we want to hear about the problem and the prior art. The inventor should be gently guided to hold off talking about the solution until everything useful to know about the problem has been set out. The inventor should likewise be guided to hold off talking about implementational features until it seems that the broad inventive concept is well in hand.

### **Don't Let Any Necessary Detail Get By**

Proceeding slowly and carefully involves controlling the pace of information delivery and gently restraining the inventor from moving forward until the attorney is satisfied that either he has understood everything or that any details not understood do not *have* to be understood—at least not just yet.

This aspect of the process is embodied in the prescription *Don't Let Any Necessary Detail Get By*.

The danger in letting a necessary detail get by is that the attorney risks losing control of the information flow, jeopardizing his position as the discussion leader. Certain details are sometimes crucial to understanding what's coming next. The author recalls early in his practice allowing details to get by, with the thought that "I'll figure that out by myself later." But once a few details are allowed to get by, the solid core of understanding being built up can get spongy at the edges. Gaps open up. Confusions build on one another. It gets harder to ask meaningful questions. The attorney's role as discussion leader quickly gives way to that of discussion follower. The self-directed learning process self-destructs, and the interaction lapses into classroom mode.

Recovery is always possible, but we must be proactive. Having realized that a necessary detail has gotten by, the attorney must bring the inventor back to a place where everything was clear so that the discussion can set out again from there.

Joanna, I got lost about two minutes ago when you started talking about the protein folding. I understood what you said about the protein itself, but tell me again about the folding.

The sooner we circle back and recover, the better. The small amount of backtracking needed to return to solid ground and repair whatever holes in our understanding have developed will not disrupt the discussion. The inventor, rather than being annoyed, will appreciate requests for clarification because they show that the listener is being attentive and genuinely interested in what the inventor is trying to explain.

There is no point in letting the inventor continue on in the hope that things will become clear later. Invariably, they become increasingly *unclear*. Sometimes it *can* all be figured out later, but usually only after expending a great deal more time than if we had simply stopped the inventor and asked a few pointed questions. And many times we cannot figure it out at all, requiring a follow-up session or extended phone call that might not otherwise have been necessary.

Depending on the context, a detail may or may not be “necessary.” Is it important to know that a screw holding two parts together is copper rather than steel? Probably not, if all that matters is the screw’s function as a fastener. But this detail could be important if proper functioning of the overall device requires that it be completely nonmagnetic.

A detail may be important to know, but not at present. Certain details may be required for the specification to meet the requirements of “enablement” or “best mode” but can get in the way at an early stage of the discussion, when the focus is on the problem and the broad solution. Letting such details get by early on is a good thing. They can be revisited later, when they *are* necessary.

One develops a facility for making on-the-fly judgments as to whether particular details can be safely allowed to get by. But if it is not immediately apparent whether a detail needs to be understood at a point in time, we need to interrupt the inventor and find out:

I didn’t understand what you just said about how the counterweight is held together. But maybe I don’t *need* to. We’re still talking about the problem you set out to have the invention solve. Am I going to have to understand how the counterweight pieces are held together to understand the problem?

Finally, a few other techniques that help ensure that necessary details do not get by:

- Question the meaning of jargon used by the inventor. The inventor will not think you stupid or ill informed. Inventors do not actually

expect people outside their field to know their jargon. It is just that they've been using it so long that to *them* it seems like regular English; just as patent attorneys routinely use terms like "prior art" and "Office action" as though these are common phrases that everyone would know.

- Interrupt the flow of technical facts to comment on or redirect the communication, as needed. The attorney needs to be both the guide and the guided. Don't be afraid to alternate between those two roles.
- Don't be afraid to talk about process. Most of the inventor-attorney dialogue will be about the invention *per se*. But one can also communicate about the communication process itself. It is always appropriate to say things like:

"I don't understand."

"Let's go back."

"This is going too fast for me to take in."

"Is this relevant to the problem that the invention solves?"

"Let me feed back to you what I think you just said."

"I thought I knew what a hidden Markov model is, but now I'm not sure."

"This is too much detail for me right now."

"I think I just had an insight."

- Be sensitive to twinges of uneasiness that arise upon realizing that necessary details have gotten by. Those little feelings warn that something is wrong. Stop the process and circle back.
- Periodically confirm that your understandings are correct. Suspend the inventor's delivery of new information every so often in order to summarize what you think you've been told, so that the inventor can correct any errors. Restate things in a way that makes sense to *you*. If analogies come to mind, share them. A creative repackaging of the inventor's disclosure rewards her efforts as technological tutor. It can also generate insights that help the attorney-inventor team come to a more complete appreciation of the inventive concept.

### **Engage Your Technological Curiosity**

The active attorney involvement that lies at the heart of the self-directed learning approach should be driven by an engaged curiosity about the invention. If the inventor says something that seems technologically

improbable, the attorney needs to ask, “*Why is that?*” Something that seems wrong may actually be something remarkable that lies at the heart of the invention. On the other hand, the inventor may simply have said something incorrect. Or the attorney may have misunderstood what he was told.

An engaged curiosity about the invention not only supports the learning process, but can also lead to insights about the invention and its true breadth. Questions from the attorney may stimulate the inventor to rethink certain assumptions about what she had thought was absolutely required for the invention.

An engaged curiosity about the invention also helps establish rapport with the inventor and often bolsters her interest in the patent application process. This may be crucial to getting the patent work completed if other matters vie for the inventor’s time.

On the other hand, the attorney has to know when to stop satisfying his curiosity and move on. At some point he will have heard enough details to recognize that any *further* details are clearly too far “down in the noise” to aid in an understanding of the invention or coming to any insights about it. That is the point at which the discussion needs to be redirected to other topics.

Just when that point has been reached may not be apparent until at least some unnecessary details have already been laid out. With experience, the attorney develops a sense of when he’s probably heard enough. This is a matter to be checked out with the inventor:

It sounds like we’re now just talking about routine implementational details that don’t impact on what’s really novel here. Am I right, or is it possible that further discussion on this point will help us to further understand the invention?

Figuring out when we’ve learned enough is analogous to following a vein in a gold mine. The miner keeps digging in a particular direction as long as the rocks being dug out contain meaningful amounts of gold ore. It is difficult to know whether the vein has really run out until the miner has dug at least a little past it. But once it becomes clear that the vein has run out, it is time to begin digging elsewhere.

### **Rely on the Inventor from the Outset**

New practitioners sometimes avoid relying on the inventor for background information about the technology in question. We certainly would like to present ourselves as technologically sophisticated, ready from the outset to absorb the specifics of the inventor’s narrative. When there is a helpful write-up or treatise with information that can give the

attorney a leg up—a chapter in a textbook, or perhaps a previously written patent or patent application—we can certainly consult it.

Usually, however, securing a suitable technological background from sources other than the inventor is difficult. Professional journal articles are usually too advanced to be of much help. The well-written textbook chapter or patent that can convey to the technological nonspecialist “everything you always wanted to know about . . .” seldom exists.

The attorney must therefore rely on the inventor from the outset.

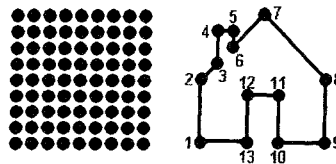
In the law firm setting, this is rarely even an issue. The pressures of pushing the work through preclude spending hours on preliminary research. In corporate patent departments, however, the emphasis on “numbers” is often not as great, particularly for “new-timers” getting their feet wet. It is usually possible, then, to search the Internet or take oneself down to the company’s corporate library and dig in.

It is still not a good idea, however.

Imagine being given a connect-the-dots picture in which most of the dots are not actually part of the picture, and the little numbers aren’t there either. Which dots are actually needed for the picture? How are they supposed to be interconnected? Obviously, it’s an impossible task.

Similarly, the attorney trying to get up to speed in a particular technology without the inventor’s guidance doesn’t know which aspects of the prior art—the dots—are actually part of the picture, nor can he know how those that *are* important interrelate in the context of the problem the inventor set out to solve. Every area of technology is replete with countless facts and concepts, most of which will turn out to have nothing to do with the invention at hand. No doubt it is possible to study written sources and ultimately acquire the necessary technological background; but the process will be inefficient because it cannot be sharply focused and will sweep in a substantial amount of extraneous matter along the way.

By contrast, using the inventor as one’s resource via the discipline of self-directed learning avoids waste. The inventor points out the relevant dots and explains how they interrelate in the context of the invention. Inventors—particularly first-time patent applicants—are usually pleased to have someone else pay close attention to their work, and are willing to put in the time to bring the attorney on board with the technology. Certainly, if the inventor is the one who will own the resulting patent, she



**FIGURE 20-2** Trying to learn relevant background without the inventor’s guidance is like trying to complete a connect-the-dots picture in which most of the dots are irrelevant and there are no numbers.

has the incentive to help. Moreover, an attorney's skillful active engagement with the inventor usually serves as a satisfying substitute for an attorney's lack of specific technological background. It is satisfying because, in return for her time investment, the inventor gets to see her invention framed from a patent attorney's perspective. Inventors are often astounded when presented with the broad inventive concept that the attorney has teased out of the embodiment(s). The more mature an attorney's skills, the more the inventor relishes the opportunity of working with him in all aspects of the patenting process. Indeed, inventors often report having gained valuable insights about their inventions as the result of discussions with their patent attorneys.

However, if the inventor balks at spending the time needed for the attorney to come up to speed in the technology, someone else should be sought. A surrogate for the inventor can sometimes be assigned, such as a co-inventor or knowledgeable engineer elsewhere in the inventor's company. Sometimes a different patent attorney with more specific knowledge of the technology in question is available.

The library and the Internet should be the last resort.

### **It Can Be Hard to Get Started—But You Have To**

Beginning practitioners may find it hard to get started with the self-directed learning approach, but it has to be done.

It is not uncommon to have a sense of inadequacy in the face of the inventor's depth of technical knowledge. We are loathe to be seen as less than fully competent or as wasting other people's time.

One of the more comfortable places to retreat in the face of such doubts is the technical library—there to postpone making contact with the inventor until we have taught ourselves the basic technology. As we saw earlier, that is not a way to go. The other place of refuge is the familiar and comfortable learning paradigm of our youth—the classroom model and role of the student as empty vessel. Indeed, as long as we sit there taking notes, nodding, and hoping to sort it all out later, we *can* fake it—but only for so long.

Getting it all straight may require any number of follow-up phone calls with the inventor—or another entire face-to-face interview session. Or if we just plow ahead based on whatever we *think* is correct, the draft patent application may have significant mistakes. In either case, our fears of being seen as less than fully competent may ultimately be realized, but magnified many times over.

That's for starters. Inventors encountering significant errors in a patent application often just put it aside, not having the mental energy, the interest, or the time to fix it up. The draft may sit on the inventor's

desk for weeks or months, even in the face of attorney follow-ups and reminders. Or what is just as bad—and happens all too often—the inventor may just give up and approve the draft as is, mistakes and all.

The self-directed learning approach can help us avoid all of that. Actively enlisting the inventor's help—not as lecturing teacher, but as a resource that we use to teach *ourselves* about the invention—pays off handsomely for all concerned.

### **Involve the Inventor in Preparing the Application**

For many practitioners, one face-to-face meeting with the inventor is all that the parameters of their practice allows. However, inventor involvement in preparing a patent application can extend over a wide range—from virtually no involvement all the way up to joining the attorney at the keyboard and the two of them writing the entire application together, even the claims. Many factors determine the degree of inventor involvement: the extent to which the attorney is interested in and capable of involving the inventor in the writing process; the inventor's interest and aptitude in doing so; other demands on the inventor's time; and how close their offices are to one another.

All this having been said, the greater the inventor involvement in preparing the application, the better the application. It will certainly be more efficient for the attorney, and often for the inventor as well.

Having blocks of time set aside to work with the inventor allows the attorney to work in a more concentrated fashion than if working alone, subject to interruptions from phone calls and e-mail. The application's logical structure and terminology stay fresh in the attorney's mind. As a result, because the attorney knows where he is in the process and knows the terminology, the writing process requires fewer total hours than when the application is worked on for shorter periods of time that may stretch out over weeks or months.

The inventor's participation in the writing process avoids what would otherwise be stopping points where the attorney would have to pause to figure out things that are unclear or to suspend the process while awaiting a callback from the inventor to answer questions. This way, the inventor is right there to answer any questions and the writing moves forward smoothly. Fewer hours will be spent on the application, and the terminology will be more consistent, because everything stays fresh in the writer's mind.

Inventor involvement also pays dividends when it is time for her to review the final draft. Even if the inventor is prompt in beginning the review of an application that the attorney wrote on his own, she may quickly put the application aside if she becomes confused about what

she's being asked to review. If there are significant mistakes that she can't readily fix, especially if she is expected to do the revision, she may just put it aside. Even worse, she may pass over errors without correcting them, thinking that "well, that's just the legalese." All of these concerns substantially go away when the inventor is there with the attorney in the first instance—any errors in the writing will have been pointed out by the inventor and corrected in real time.

### **A Four-Stage Collaborative Process for Preparing the Application**

The following is a four-stage process favored by the author for working with the inventor to learn about the invention and prepare the patent application.

#### *Stage I: Problem-Solution Statement/Fallback Features/Drawings*

The attorney and inventor meet to discuss the invention. The attorney may already have some idea about the invention based on a technical memorandum or other written material that the inventor may have supplied in advance. In any event, the goal of this meeting is to develop a refined problem-solution statement based on discussion about the problem, how the inventor solved it, and whatever prior art the inventor is aware of.

The output, or "deliverable," of this first stage is a refined problem-solution statement and identification of the important fallback features. If there is time, this is a good opportunity to sketch out at least the high-level drawings for the patent application. Indeed, sketches made by the inventor as she gives her narrative often serve as the basis of at least some of those drawings. For this reason, the inventor should be encouraged to make her sketches on paper so that a hard copy is available at the end of the session and nothing will have gotten erased in the process. Or a digital camera might be used to capture whiteboard drawings.

If circumstances permit, it is a good idea to put off proceeding to Stage II for at least one day. Stage II is devoted to writing the Background and Summary. That effort benefits from the attorney having a little time "off-line" to let his subconscious solidify his understanding of the invention. Indeed, some of the author's best insights about an invention have arisen on the drive home and at other random moments. This is also an opportunity to develop a general sense of the first few sentences of the Background. The stage is thereby set to hit the ground running when sitting down with the inventor to compose the Background and Summary in Stage II.

Stage I may take about 2–3 hours, depending on the complexity of the invention and the nature of the prior art to be distinguished over.



*Stage II: Background and Summary*

Writing the Background and Summary is often a painstaking process, even with the problem-solution statement in hand. Sometimes it is hard to find the right “handle” to get the Background under way. It takes time to work in all the terminology that will be relied on in the Summary’s one-sentence invention statement. Additional insights as to the breadth of the invention, or as to how the invention can be articulated in alternative ways, may develop as the text evolves. Revision of the problem-solution statement or developing alternative problem-solution statements may be a lengthy process.

A lot of time will be spent writing relatively few words. Every word added to the writing—particularly in the Summary—will be critically evaluated to ensure that the one-sentence statement of the broad invention is as perfect as it can be. But this is time well spent. This is when the structure of the invention story gets laid out and terminology for the application gets developed. The investment of time will pay dividends in the efficiency with which the Detailed Description will be able to be written, based on the foundation thus laid.

Expect to spend as much as 3–4 hours when writing the Background and Summary. This could well extend to a full day if the invention is particularly complex.

*Stage III: Detailed Description*

With the invention story well in hand, the Detailed Description can be written quickly and efficiently, proceeding from one figure of the drawing to the next, using the Background and Summary as a template and highlighting the invention and its fallback features as the narrative evolves.

If a technical memorandum or other detailed write-up authored by the inventor already exists, that document can be used pretty much “as is” to supply all the details required for enablement. A two-part Detailed Description often works. The first part will be a “General Description” or “Overview” mostly comprising newly written material that expands upon the invention story as told in the Background and Summary, using several high-level figures to illustrate the invention and its fallback features. The inventor’s write-up can then be dropped into the Detailed Description as the second, more detailed part.

Stage III can sometimes be completed in a single day for a simple invention and a single disclosed embodiment. More complicated applications may require much more time. If the inventor’s time is limited, the attorney can work alone to complete the Detailed Description.

*Stage IV: Claims*

Inventors who have found the time to help write the specification often welcome the opportunity to work on the claims as well. Most attorneys would prefer to work alone at this task. Yet, there are benefits when the attorney and inventor work on the claims together, and the reader is urged to try it. Infringement loopholes are more likely to be identified by the inventor if she is actively engaged in the claim-drafting process than if she reviews the claims after the fact, even with attorney guidance. The inventor is similarly more likely to perceive claim overbreadth based on prior art that she is aware of when she is fully participating in the claim-drafting process.

For a relatively simple invention, two or three claim families can be written over the course of several hours. More time will be required for complex inventions or for more extensive claim treatments.



The classic question of the new patent attorney is, “What should I write first?”

Some mentors suggest that it should be the Detailed Description. It is thought that this is a good way to get the juices flowing and for the attorney to “get a feel for” what has been invented. Others instruct that at least some of the claims be written first to ensure that the Detailed Description—in fact, the entire specification—will be drafted in a way that provides the claims with the necessary conceptual and terminological underpinning.

However, the author’s answer to the new attorney’s question, “What should I write first?” is this: “You shouldn’t write *anything* first. Figure out what the invention is and then you can write whatever you want.”

It is hoped that these pages have brought the reader to that point of view. The patent attorney’s first task is to answer the question *What Is the Invention?* After that, the order in which things get written down is of little moment. The end product will be fabulous no matter what. A patent application prepared with the inventive concept fully in hand at the outset will be one that best serves the inventor, the patent owner and, indeed, the invention itself.

### Note

1. 35 U.S.C. 112, ¶ 1.

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## APPENDIX A

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# Inventive Concepts and Their Problem-Solution Statements

The following is a sample of inventions for which United States patents have been granted over the last hundred years or so. Each invention is represented by a statement of its inventive concept and a problem-solution statement (both drafted by the author). A claim from the issued patent is also presented.

### Ammonia Production

**U.S. Patent 971,501—Fritz Haber et al.**

***Inventive Concept:*** Use osmium as the catalyst in combining nitrogen and hydrogen to make ammonia.

***Problem-Solution:*** The problem of producing ammonia at a low temperature and as quickly as possible *is solved by* passing gases containing nitrogen and hydrogen over a catalyst containing osmium.

***Claim:*** The process of producing ammonia by passing gases containing nitrogen and hydrogen over a catalyst containing osmium.

### Fuel-Propelled Rocket

**U.S. Patent 1,103,503—Robert H. Goddard**

***Inventive Concept:*** Keep the fuel for a rocket in a casing that is separate from the combustion chamber.

***Problem-Solution:*** The problem of enabling a rocket to carry a large amount of combustible material while keeping the weight of the rocket as low as possible *is solved by* successively feeding portions of the material to the combustion chamber from a separate casing containing the supply of combustible material.

**Claim:** A rocket apparatus having, in combination, a combustion chamber, a casing containing a supply of combustible material, and means for successively feeding portions of said material to said combustion chamber.

### **Packaging Frozen Food**

**U.S. Patent 1,773,079—Clarence Birdseye**

**Inventive Concept:** Package food in its container and then freeze under pressure.

**Problem-Solution:** The problem of being able to package and preserve food in an economical and commercially practical way *is solved by* first packing the food in the container in which it is to be marketed and freezing the same under pressure applied to substantial surface areas of the packed container.

**Claim:** A method of packaging and preserving food which consists in first packing the food in the container in which it is to be marketed and freezing the same under pressure applied to substantial surface areas of the packed container.

### **Negative Feedback**

**U.S. Patent 2,102,671—Harold S. Black**

**Inventive Concept:** Reduce the distortion created by an amplifier by using negative feedback.

**Problem-Solution:** The problems of distortion and inconstant gain in a wave translating device having amplifying properties that receives fundamental waves at its input and that carries fundamental components and other wave components at its output *is solved by* controlling the relative magnitudes of the fundamental and other components at the output by feeding waves from the output to the input to decrease the gain of the system.

**Claim:** In a wave translating device or system having amplifying properties, an input portion and an output portion, means to apply fundamental waves to said input portion, said system carrying fundamental components in said output portion and having means producing other wave components in said output portion, and means controlling the relative magnitudes of said components in said output portion comprising means to feed waves from said output portion to said input portion to decrease the gain of the system.

## Magnetic Recording

**U.S. Patent 2,351,004—Marvin Camras**

**Inventive Concept:** Record signals by generating a modulated magnetic field and passing the recording medium (e.g., steel wire) through the modulated magnetic field parallel to the lines of force.

**Problem-Solution:** The problem of distortion in magnetically recording fluctuating electrical energy on a paramagnetic body *is solved by* passing the paramagnetic body through a high frequency magnetic field produced by the joint action of a high frequency exciting current and the fluctuating electrical energy, the direction of motion of the body through the field being parallel to the direction of the lines of force of the magnetic field.

**Claim:** The method of magnetically recording fluctuating electrical energy on a paramagnetic body which includes passing the paramagnetic body through a high frequency magnetic field produced by the joint action of a high frequency exciting current and the fluctuating electrical energy, the direction of motion of the body through the field being parallel to the direction of the lines of force of the magnetic field.

## Telephony

**U.S. Patent 3,500,000—John L. Kelly Jr. et al.**

**Inventive Concept:** Subtract echo replicas from outgoing signals in a communication system and use the resulting signal to adapt a processor that generates the replicas.

**Problem-Solution:** The problem of preventing echoes of speech signals in a first one-way transmission path of a communication system from appearing in a second one-way transmission path of the system *is solved by* algebraically combining the speech signals in the second path with speech signals supplied from an adjustable signal processor connected in the first path, and adjusting the signal processor in response to the combined signals.

**Claim:** An echo canceller which comprises adjustable signal processing means connected in the first of two one-way transmission paths of a communication system,  
means connected in the second of said two one-way paths for algebraically combining speech signals in said second path with speech signals supplied from said processing means, and

means responsive to said algebraically combined speech signals for adjusting said signal processing means.

### Superconducting Devices

**U.S. Patent 3,600,644—Robert E. Eck**

***Inventive Concept:*** Use only one superconductive member rather than two in a Josephson effect circuit.

***Problem-Solution:*** The problem of easily and inexpensively fabricating a low temperature Josephson effect circuit of the type comprising a first, tapered metal member having a small area contact with a flat surface of a second metal member *is solved by* having only one of the members constructed of a material that is superconductive at cryogenic temperatures.

***Claim:*** A low temperature circuit exhibiting Josephson effects comprising a first metal member and a second metal member, one of said members being constructed of a material that is superconductive at cryogenic temperatures, the second member being constructed of a material that is normal or non-superconductive, one of said members having a flat surface and the other of said members having a tapered end positioned in contact with said flat surface to form a small area contact.

### Laser Vision Correction

**U.S. Patent 4,665,913—Francis A. L'Esperance Jr.**

***Inventive Concept:*** Use ultraviolet irradiation and attendant ablative photodecomposition of the cornea to reshape the anterior surface of the cornea and thereby correct sight, e.g., for myopia.

***Problem-Solution:*** *The problem of* correcting sight *is solved by* operating solely upon the anterior surface of the cornea of the eye using selective ultraviolet irradiation and attendant ablative photodecomposition of the anterior surface of the cornea in a volumetric removal of corneal tissue and with depth penetration into the stroma and to a predetermined curvature profile.

***Claim:*** The method of changing optical properties of an eye by operating solely upon the anterior surface of the cornea of the eye, which method comprises selective ultraviolet irradiation and attendant ablative photodecomposition of the anterior surface of the cornea in a volumetric removal of corneal tissue and with depth penetration into the stroma and to a predetermined curvature profile.

## Two-Stroke Engines

**U.S. Patent 5,375,573—Timothy J. Bowman**

**Inventive Concept:** Atomize lubricating oil in a two-stroke engine using the same compressed air source that atomizes the fuel.

**Problem-Solution:** The problems associated with the use of oil jets and feed valves in a two-stroke engine to atomize lubricating oil that is to be injected into the crankcase directly upon points requiring lubrication *are solved by* atomizing the oil using compressed air taken from the pressurized air rail that produces an atomized fuel spray for injection into the individual combustion chambers.

**Claim:** A two-stroke engine having a pressurized air rail for producing an atomized fuel spray for injection into individual combustion chambers, in which oil for lubrication is atomized by metering said oil into a stream of compressed air taken from the rail or from a reservoir connected thereto and the resulting oil/air mist is injected into the crankcase directly upon points requiring lubrication.

## Mass Spectrometry

**U.S. Patent 5,376,791—Lynwood W. Swanson et al.**

**Inventive Concept:** Increase the yield of secondary ions in a secondary ion mass spectrometry system by having iodine vapor in the chamber.

**Problem-Solution:** The problem of increasing the secondary ion yield of sample materials bombarded by an ion beam directed toward a location on a sample material is solved by directing iodine vapor at that location while the ion beam is incident thereon, thereby enhancing secondary ion yield.

**Claim:** A method of increasing the secondary ion yield of sample materials bombarded by an ion beam, said method comprising the steps of:

directing an ion beam toward a location on a sample material, and

directing iodine vapor at said location while said ion beam is incident thereon for enhancing secondary ion yield.

## Optical Communications

**U.S. Patent 5,371,815—Craig D. Poole**

**Inventive Concept:** In a spooled-fiber dispersion compensator, align the mode pattern of the signal relative to the plane of the bend of the spooled fiber.

**Problem-Solution:** The problem of bending losses in a dual-mode fiber dispersion compensator comprising a spooled length of optical fiber *is solved by* energizing the fiber with an optical signal having a single spatial mode including one or more mode null lines that lie in the plane of the bend of the spooled fiber.

**Claim:** A spooled length of optical fiber; and means for energizing said fiber with an optical signal having a single spacial [sic] mode including one or more mode null lines that lie in the plane of the bend of said spooled fiber.

### Integrated Circuit Fabrication

U.S. Patent 5,389,554—William U.C. Liu et al.

**Inventive Concept:** Use an AlGaAs layer as both a ballast resistor and as the active emitter for a heterojunction bipolar transistor.

**Problem-Solution:** The problem of fabricating a heterojunction bipolar transistor having ballasting resistance for its plurality of emitter fingers without encountering hot spotting, space charge conduction and other disadvantageous phenomena *is solved by* epitaxially depositing an emitter layer of  $\text{Al}_x\text{Ga}_{1-x}\text{As}$ , where  $x > 0.4$ , adjacent a base layer, whereby the emitter layer provides ballasting resistance for each of the fingers.

**Claim:** A method for fabrication of heterojunction bipolar transistors having a plurality of emitter fingers, comprising the step of:

epitaxially depositing an emitter layer of  $\text{Al}_x\text{Ga}_{1-x}\text{As}$ , where  $x > 0.4$ , said emitter layer is adjacent a base layer, whereby said emitter layer provides a ballasting resistance to distribute a current approximately evenly through each of said emitter fingers.

### Internet Technology

U.S. Patent 5,960,411—Peri Hartman et al.

**Inventive Concept:** Enable a customer to order an item from an on-line vendor with a single action, e.g., clicking on an icon.

**Problem-Solution:** The problems of customer inconvenience and potential security breaches inherent in the “shopping cart” model of ordering an item in a client/server environment *are solved by* displaying information identifying the item and an indication of a single action that is to be performed to order the item and in response to only the indicated single action being performed, sending to a server system a request to order the identified item.



**Claim:** A method for ordering an item using a client system, the method comprising:

displaying information identifying the item and displaying an indication of a single action that is to be performed to order the identified item; and in response to only the indicated single action being performed, sending to a server system a request to order the identified item.

### Manufacturing Technology

#### U.S. Patent 6,016,817—Hans Henig

**Inventive Concept:** When using a liquid or gaseous fluid to treat a circuit board having small holes, slide the board back and forth and vibrate it at the same time.

**Problem-Solution:** The problem of being able to use liquid or gaseous treatment agents to treat plate-shaped work pieces that have extremely fine holes through which the fluid would normally flow too slowly, *is solved by* locating the work piece in a horizontal operational position and imparting a combined movement of (a) a first continuous and/or periodically intermittent sliding movement in a horizontally extending transport path, and (b) a second movement consisting of vigorous vibrational oscillations, both movements being simultaneous with and independent of one another during any such first movement.

**Claim:** Method of treating plate-shaped work pieces provided with extremely fine holes by means of liquid or gaseous treatment agents, in which to the work piece located in a horizontal operational position is imparted a combined movement, which is made up of a first continuous and/or periodically intermittent sliding movement in a horizontally extending transport path, and a second movement consisting of vigorous vibrational oscillations, both movements being simultaneous with and independent of one another during any said first movement.

### Photolithography

#### U.S. Patent 6,316,152—Hong-Chang Hsieh et al.

**Inventive Concept:** Generate line jog inexpensively by allowing sharp corners in the line as masked and relying on optical proximity effects to smooth out the corners when the line is actually formed.

**Problem-Solution:** The problem of being able to inexpensively generate a jog in a line within a pattern on a photolithographic reticle *is solved by* a line layout comprising two equal-width line segments laterally displaced

from one another by less than their width, each line segment having pointed corners at respective ends that touch.

**Claim:** A line layout within a pattern on a reticle for use during photolithography, comprising:

a first line segment, having a width and a lower end having pointed corners; a second line segment having said width and an upper end having pointed corners;

the second segment being laterally displaced, by an amount less than said width, relative to the first segment; and

said upper and lower ends touching, whereby said segments are part of a single continuous line in which there is a jog.

### Medical Devices

**U.S. Patent 6,444,324—Dachuan Yang et al.**

**Inventive Concept:** Lubricate the inside of a balloon catheter.

**Problem-Solution:** The problem of being able to prevent portions of a dilatation balloon from sticking to one another while also preventing “watermelon seeding” of the balloon *is solved by* disposing a lubricious hydrophilic material on the inner surface of the balloon.

**Claim:** A dilatation balloon comprising an inner surface and an outer surface, said inner surface having a lubricious hydrophilic material disposed thereon.

### Electric Lamps

**U.S. Patent 6,525,491—Andreas Huber et al.**

**Inventive Concept:** Switch the polarity of a discharge lamp current before a focal point can form.

**Problem-Solution:** The problem of flickering phenomena in gas discharge lamps *is solved by* operating the lamp in an AC mode such that a gas discharge is established between electrodes serving alternately as an anode and a cathode, and switching over the polarity of the lamp current before a focal point is formed on the cathode.

**Claim:** A method for operating at least one gas discharge lamp having electrodes, the method comprising  
operating the gas discharge lamp in an AC mode wherein a gas discharge is established between the electrodes which alternate as an anode and a cathode during lamp operation, and  
switching over polarity of lamp current before a focal point is formed on the cathode,  
whereby flickering of the gas discharge lamp is reduced.

## Recording Media

U.S. Patent 6,526,005—Johannes J. Mons

**Inventive Concept:** Encode the diameter of a CD within the CD data.

**Problem-Solution:** The problem of being able to take the inertia of a disc-like record carrier [e.g., compact disc] into account in order to control its rotation *is solved by* including the actual physical diameter of the carrier in a machine-readable information track in which record carrier control information is provided.

**Claim:** A disc-like record carrier having an actual physical diameter, the carrier comprising a machine-readable information track in which record carrier control information including the actual physical diameter is provided.

## Integrated Circuit Manufacture

U.S. Patent 6,569,580—Jim G. Campi

**Inventive Concept:** Use diamond-like carbon in the energy-blocking regions of an integrated circuit mask.

**Problem-Solution:** The problem of improving the strength, resolution, and mask error factor of a binary mask of a type comprising an energy-transparent substrate and having energy-transmitting and energy-blocking regions, *is solved by* adhering diamond-like carbon (DLC) to the energy-blocking substance that is adhered to the substrate in the energy-blocking regions.

**Claim:** A binary mask having energy-transmitting regions and energy-blocking regions, comprising:  
an energy-transparent substrate;  
an energy-blocking substance adhered to the substrate in the energy-blocking regions; and,  
diamond-like carbon (DLC) adhered to the energy-blocking substance.

## Semiconductor Memories

U.S. Patent 6,574,148—Christophe Chevallier

**Inventive Concept:** Drive the bit lines of a voltage programmable memory from both ends.

**Problem-Solution:** The problem of being able to use lower-than-usual voltage levels to program an array of voltage programmable memory cells of a type having bit lines coupled to respective portions of the memory cells *is solved by* coupling driver circuits to both end regions of each of the bit lines.

**Claim:** A memory device comprising:  
an array of voltage programmable memory cells;  
a bit line coupled to a portion of the memory cells; and  
first and second driver circuits respectively coupled to first and second end regions of the bit line.

### Memory Drives

#### U.S. Patent 6,577,463—Gregory Frees

*Inventive Concept:* Adjust timing window for reading from a storage device based on a calculation of the tangential misalignment.

**Problem-Solution:** The problem of tangential misalignment in a direct access storage device is solved by pre-compensating for the misalignment by adjusting a timing window during which the transducer head reads the information located on the storage surface based on a calculation of tangential misalignment of the transducer head with respect to the information located on the storage surface.

**Claim:** A method of pre-compensating for tangential misalignment in a direct access storage device having information located on a storage surface and having a transducer head for reading the information, the method comprising:

generating a calculation of tangential misalignment of the transducer head with respect to the information located on the storage surface; and  
adjusting, in accordance with the calculation of tangential misalignment, a timing window during which the transducer head reads the information located on the storage surface.

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## APPENDIX B

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### An Exercise for the Reader— and the Author

Here is an invention analysis exercise involving the invention of the backspace key. The reader can use this exercise to try out the invention analysis techniques presented in the book—begin from the problem, draft a problem-solution statement, and then hone it to a sharp edge by trying it on for size and making changes as needed to make it as broad as possible without reading on the prior art. If it is not clear whether some particular feature of the disclosed embodiment should be regarded as being in the prior art, the reader should make an assumption one way or the other and go from there.

The exercise is followed by a transcript of the author's thought processes when working the exercise himself. It is presented in the first person and the present tense to accentuate the stream-of-consciousness thought process that plays such a big role in invention analysis. Presenting the author's answer in this way will hopefully impart some feel for how the iterative process of hypothesizing a problem-solution statement and trying it on for size can actually play out.

The reader's train of thought and ultimate conclusions will be different from the author's. Seeing the invention in different ways, however, is an important facet of claim diversity.<sup>1</sup> Much will depend on what the reader perceives as the problem(s), if any, solved beyond the problem explicitly indicated in the exercise itself. A lot will also depend on what assumptions were made about the prior art.

#### Backspace Key Exercise

It is some time in the past. An inventor arrives at her patent attorney's office carrying the typewriter of Figure B-1. Like prior art typewriters, it has alphabetic keys and a space bar. However, a feature of this typewriter that no other typewriter has ever had is a backspace key. The embodiment includes a mechanical linkage between the backspace key and the carriage that causes the carriage to back up by one



**FIGURE B-1** The invention of the backspace key (in circle).

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character position when the backspace key is depressed.

The inventor explains that prior to her invention, typists would have to manually move the carriage back to the location where it was desired to retype a particular letter. This is a tedious and inconvenient process that interrupts the flow of typing. Moreover, having to reposition the carriage by hand is not as easy as it sounds. In moving the carriage backward, it is all too easy for the typist to overshoot the immediately preceding location and then have to “space” over to it.

Prepare a problem-solution statement for this invention.

### The Author’s Solution

My initial problem-solution hypothesis is based essentially on what the inventor said.

#### First Hypothesis:

*The problems of inaccuracy and inconvenience in having to manually move a typewriter carriage backward to retype a character at the previously typed location is solved by providing a key that will back up the carriage by one character location.*

Trying this first hypothesis on for size, it seems much too focused on the exact problem and the exact solution. I wonder if there’s something else really going on, both from the standpoint of the problem and of the solution. It occurs to me that the problem isn’t so much being able to back up, but being able to go to any desired location on the paper without having to type a character in order to get there. Broadly speaking, it seems then that the solution is to provide some mechanism for doing so other than moving the carriage by hand. This leads me to my second hypothesis.

#### Second Hypothesis:

*The problem of having to manually move a typewriter carriage in order to thereupon be able to type at any desired location is solved by providing a key that will move the carriage to a desired location without requiring manipulation of the carriage by the typist.*

It is immediately clear that this problem-solution statement is too broad. I have managed to write words that read on the very prior art I am trying to avoid—the character keys and the space bar. The hypothesis needs to be narrowed. What problem, I ask myself, is solved by the backspace key that is not solved by the character keys and space bar? What's really going on<sup>2</sup> with the backspace key that isn't going on with the other keys? One characteristic of the backspace key, I realize, is that it does not create any mark on the paper. No good. This distinguishes the backspace key from the character keys, but not from the space bar. I despair of defining this invention without including the notion of backing up. Indeed, it occurs to me all of a sudden that the backspace key is the exact opposite of the space bar. Each one moves the carriage one character location without creating a character—the space bar moves it forward, and the backspace key moves it backward. Given how close the prior art space bar function is, I have convinced myself that the invention necessarily involves the notion of backing up. I do recognize, in a broadening sense, however, that a key that causes the carriage to back up is a new functionality, irrespective of how far it backs up. So I see that I don't have to limit the invention to backing up by only one space. A key that takes the carriage to an "already-passed location" ought to do.

### Third Hypothesis:

*The problems of inaccuracy and inconvenience in having to manually move a typewriter carriage backward in order to type at an already-passed character location are solved by providing a key that, when operated, will place the carriage at that character location.*

Certainly not too broad, but my sense is that maybe there is something else. Is there an inventive forest to which the backspace key belongs—but to which the space bar and character keys do not—other than the fact that it moves the carriage backward? It comes to me. The character keys and space bar create written language. Even though the space bar doesn't create a printed character, the thing that it does is integrally a part of the writing process. A space is a character in that sense. The backspace key doesn't do that. It is a control key, I realize. It is the first-ever tree in the typewriter control-key forest. The problem solved was broader than the inventor thought. By a lot. The invention is something that effectuates the operation of the typewriter while not creating a character. I decide to be my own lexicographer and define something I will call a "control function," which I will define to mean any operation other than creating printed characters or spaces. I then rehypothesize the invention for a fourth time.

#### Fourth Hypothesis:

*The problem of being able to conveniently effectuate at least one control function of a typewriter is solved by providing a keyboard key that is operable to effectuate such an operation.*

I'm pretty happy with this hypothesis. I feel I'm getting close. Trying this one on for size, though, I find myself wondering if it is functional enough. "What's the underlying functionality?" I ask myself. If the inventive realization was the idea of providing some shortcut way to effectuate a control function, is a "key" necessary? I decide to try out some far-fetched alternatives.<sup>3</sup> The notion of something that will respond to voice commands is a far-fetched embodiment that often bears fruit. Any way to effectuate a control function ought to do, I think to myself, including speaking a command to the typewriter. To worry about the particular way this particular typewriter effectuates the control function is really about *what* rather than *how*. And at the same time as I'm thinking about being unduly fixated on "hardware," I'm worrying that maybe the term "typewriter" is too limiting. Functionally speaking, the invention relates to effectuating a control function of an apparatus that creates lines of printed characters. Here we go again.

#### Fifth Hypothesis:

*The problem of being able to conveniently effectuate at least one control function of an apparatus that creates lines of printed characters is solved by providing a means that is operable to effectuate such an operation.*

I like the problem statement now, but the solution is once again too broad. Per my current definition of "control function," this language reads on the knob and related mechanism that allows the typist to roll the paper onto the machine. By my own definition, that is certainly a "control function." Should I limit myself to a control function that relates to the positioning of the carriage in a left/right sense? The roller knob certainly doesn't do that. But such a limitation is not problem-solution based. I worry that to limit the invention to a control function that deals with left/right operations of the carriage is to merely latch on to any convenient limitation, with the result that I might be allowing something to escape. What's really going on with the backspace key that isn't going on with the roller knob? The roller knob is convenient, I tell myself. I realize I have allowed myself to lose focus on the problem—lack of convenience was the problem. So then are we back to the fact that the control function is performed by a key, that being more convenient than the manual mov-



ing of the carriage? I hope not. Don't forget the far-fetched embodiment about speaking a backspace command, I tell myself. So whence arises the convenience? There's a sort of remote-control feel to this. Rolling the paper onto the platen with the little knob is a direct, non-remote-control type of operation that directly manipulates the platen.

Aha! An intermediary operation. By allowing for an intermediary operation, we can achieve convenience, albeit at the possible cost of additional complexity. If it's a backspace key, the intermediary operation is the activation of some linkage or other mechanism that moves the carriage by remote control. If it's voice command, the intermediary operation is the electronic recognition of the command and the consequent operation of some physical intermediary that can actually move the carriage.

#### **Sixth Hypothesis:**

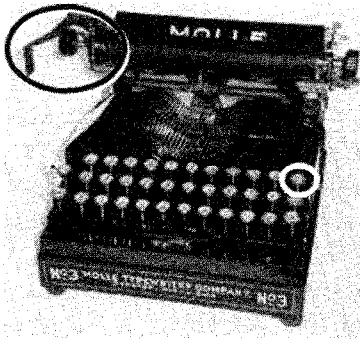
*The problem of being able to conveniently effectuate at least one control function of an apparatus that creates lines of printed characters is solved by providing a means responsive to a user action to effectuate an intermediary operation that, in turn, effectuates said control function.*

I'm done with the problem-solution statement and can now draft a claim based on it.

Apparatus comprising  
printing means for creating printed characters,  
control means for effectuating at least one control function of the  
printing means, and  
means responsive to a user action for effectuating an intermediary operation that, in turn, effectuates said control function.

#### **Some Afterthoughts**

Some of my thinking here was no doubt tainted by my knowledge of what was to come: typing-ball-based typewriters, computer keyboards, and cell phones with a backspace key. I tried to put them out of my mind, but I'm not sure how successful I was. In any event, the final problem-solution statement does a pretty good job of capturing the embodiments of the future, it would seem. Backspace functionality in manual typewriters, electric typewriters, computer keyboards—all seem to be covered, including the possibility of voice control. My use of "printed" is a potential sticking point since electronically displayed characters on a screen might arguably not be "printed." I did decide to leave the word "printed" in the problem statement on the theory that a patent attorney



**FIGURE B-2** The existence of a carriage return lever (oval) in the assumed prior art would have been a complicating factor in the analysis of the backspace key invention.

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in the early twentieth century probably would not have had an inkling of thinking beyond the printed word to computer screens.

Note, too, that the assumed prior art typewriter did not include a carriage return/paper advance lever, as shown in Figure B-2. If it did, further thought would have to be put into the problem-solution statement because the sixth hypothesis above would read on such a typewriter.

Finally, I note that I had rejected the first, third, and fifth hypotheses not because they did not define patentable subject matter, but because they did not seem broad enough. But since those problem-solution statements were not found to read on prior art, claims based on them could also be

included in any patent application to be filed. The desirability of having such claims is discussed in Chapter Fourteen.

## Notes

1. See Chapter Fourteen, pp. 173–183.
2. See p. 32.
3. See p. 35.

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## APPENDIX C

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### Sample Patent

The sample patent on the following pages is directed to the book's chair example. It illustrates the principles of specification construction discussed in Part IV.

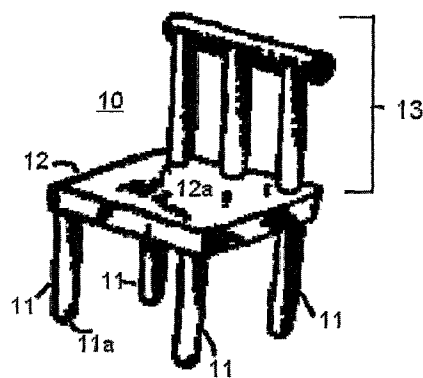
The figures of the patent application appear below.



*Fig. 1 (Prior Art)*



*Fig. 2 (Prior Art)*



*Fig. 3*

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## SEATING DEVICE

## BACKGROUND

The present invention relates to seating devices.

Several devices are known that allow people to assume a comfortable sitting position. Among these are seating devices comprising a seating platform, or "seat" held above the ground by some kind of support structure. One such seating device comprises two or more rocks piled one on top of the other to a suitable height. Another is made from a felled tree laid across two rock supports.

Advantageously, all of these devices, especially when the seating platform, or "seat" is set at a comfortable height, allow people to sit more comfortably, and for longer periods of time, than the prior practice of sitting on the ground.

## SUMMARY

The known seating devices are not readily portable because of their bulk and weight. People have not seen this as a problem but, rather, a fact of life. The present inventor, however, has recognized that making seating devices more portable would provide numerous benefits, such as enabling them to be moved into the shade as the day progresses and to enable groups of seating devices to be rearranged to suit different types of gatherings.

In accordance with the invention, the portability of seating devices is enhanced by utilizing one or more elongated members as the support structure for the seat. Such a support member can hold up a large load relative to its own weight when compressed along its longitudinal axis, thereby achieving a significant reduction in weight. Such a seating device is referred to herein as a "chair" and the elongated support members as "legs."

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The chair can have any desired number of legs. Three or four legs have proven to be the most advantageous, however.

In particular embodiments of the invention, the legs may be perpendicular to the seat and may be attached near the seat edge. Also in particular embodiments, the seat is more or less rectilinear and has four legs attached at the corners. Each of these details provides particular advantages and can be implemented independently of the others.

The legs can be made from any desired material. Indeed, they can be integral with a chair carved from stone, resulting in a seating device that is much lighter than those having solid-stone support structures as in the prior art. Particular embodiments of the invention may, however, advantageously, use wood for at least the support members.

The legs can be friction-fit into recesses formed in the underside of the seat. If desired, however, greater structural integrity for the chair as a whole can be achieved by securing the legs in the recesses with an adhesive material.

BRIEF DESCRIPTION  
OF THE DRAWING

FIG. 1 depicts a type of seating device known in the prior art;

FIG. 2 depict another type of seating devices known in the prior art ; and

FIG. 3 depicts a seating device, or "chair," embodying the principles of the present invention.

## DETAILED DESCRIPTION

Among the seating devices known in the prior art are those shown in FIGS. 1 and 2. The FIG. 1 device comprises two or more rocks piled one on top of the other. The FIG. 2 device comprises a felled tree, or log, laid across a pair of rocks, enabling more than one person to sit side-by-side. Other known types of

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seating devices are a flattened-off tree stump, and a single large rock.

The known seating devices are not readily portable because of their bulk and weight. As noted above, it remained for the present inventor to recognize that making seating devices more portable would provide numerous benefits, as detailed hereinabove. Indeed, rocks of the type depicted in FIGS. 1 and 2 may weigh hundreds of pounds. A felled tree of sufficient girth to support human sitters may also be extremely heavy.

FIG. 3 depicts a seating device, or "chair," 10 embodying the principles of the present invention that is more portable than those known in the prior art.

The chair comprises a platform, or "seat," 12 having an upper seating surface 12a where the buttocks of the sitter are placed. In accordance with the invention, seat 12 is supported above a floor or the ground by support members 11 that are elongated and that carry the weight of the seat and of a person on the seat substantially along their longitudinal axes. The present inventor has discovered that such an elongated support member can be made quite thin. Such a support member can hold up a large load relative to its own weight when compressed along its longitudinal axis. This achieves a significant reduction in weight for the seating device as a whole and makes it significantly more portable than the seating devices of the prior art.

Elongated support members 11 are hereinafter referred to as "legs." Legs 11 illustratively have rounded bottoms 11a and circular cross-sections.

A chair embodying the principles of the invention can have any desired number of legs. For example, if the chair has three legs, it is guaranteed not to wobble. However, tipping over is a concern with three legs unless they are splayed outward. But then structural strength of the legs becomes an issue because splayed legs are not being compressed

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directly along their axes, leading to the need for thick legs, horizontal reinforcements and very strong joints at the leg/seat connection points, adding to the cost of fabrication.

In accordance with an advantageous feature of the invention, and as can be seen from FIG. 3, chair 10 illustratively has four legs 11. The present inventor has discovered that four legs can be made perpendicular to the seat without giving rise to the tipping problem. And since they are compressed directly along their axes, the four vertical legs don't have to be as thick as the three splayed-out legs. Also, since there are four of them, they can be made thinner yet and still support as much weight as three thicker legs. With careful cutting to make the legs as equal in length as possible, wobbling is not a major concern. Five legs adds to the wobbling problem and also increases the weight of the chair. So four legs is regarded by the present inventor as a preferred embodiment.

In accordance with another illustrative feature of the invention, the legs are attached near the edge of the seat. This has been found to further enhance the stability of the chair, no matter how many legs it has. The present inventor has also found that the chair is particularly stable when the seat is more or less rectilinear and has four legs attached at the corners. Indeed, those features are implemented in chair 10.

A seating device having legs pursuant to the principles of the invention can be made from any desired material. Indeed, it can be carved from stone, resulting in a seating device that is much lighter than those having solid-stone support structures as in the one elongated support member prior art. Legs 11 of the illustrative embodiment are made of wood, however. The present inventor has found that wood is sufficiently strong to be used for this application while being significantly less weighty

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than stone. Indeed, seat 12 is also made of wood in this embodiment.

An aspect of the design of chair 10 is how to hold all the parts together. If the chair is left in one spot, it was found sufficient to have a friction fit of the legs in recesses formed in the underside (not shown) of the seat 12. However, the legs tend to fall out when the chair was moved, thereby compromising its portability. This problem is solved in this embodiment by securing the legs in the recesses with an adhesive material. Tree resin was used in a particular chair that was built.

Chair 10 includes a structure 13 attached near one edge of seat 12. This structure, which is referred to as a "seat back" is an innovation in sitter comfort that provides support for the back of the sitter. The concept of the seat back is an invention independent of the present invention and is the subject of a separate patent application being filed by the present inventor on the same day as this application.

The foregoing merely illustrates the principles of the invention. For example, although the elongated supports of the illustrative embodiment are below the seat, it may be possible to support the seat by elongated supports from above, such as vines or animal sinew. In addition, although legs 11 of the illustrative embodiment have circular cross-sections and rounded bottoms, other shapes and configurations are possible.

It will thus be appreciated that those skilled in the art will be able to devise numerous alternative arrangements that, while not shown or described herein, embody the principles of the invention and thus are within its spirit and scope.

What is claimed is:

1. Apparatus comprising  
a seat, and  
means for supporting said seat  
above an underlying surface, the

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means for supporting including one or more elongated support members.

2. The apparatus of claim 1 wherein the means for supporting includes four elongated support members.

3. The apparatus of claim 2 wherein the one or more elongated support members supports the seat substantially at its periphery.

4. The apparatus of claim 3 wherein the seat is substantially rectangular and each of the four elongated support members supports the seat substantially at a respective corner thereof.

5. The apparatus of claim 4 wherein the one or more elongated support members is substantially perpendicular to the seat.

6. The apparatus of claim 2 wherein the one or more elongated support members is substantially perpendicular to the seat.

7. The apparatus of claim 1 wherein the one or more elongated support members supports the seat substantially at its periphery.

8. The apparatus of claim 7 wherein the seat is substantially rectangular and each of the four elongated support members supports the seat substantially at a respective corner thereof.

9. The apparatus of claim 1 wherein the one or more elongated support members is substantially perpendicular to the seat.

10. The apparatus of claim 1 wherein the one or more elongated support members is made of wood.

11. The apparatus of claim 1 wherein the one or more elongated support members is permanently attached to the seat with an attachment means.

12. The apparatus of claim 11 wherein the attachment means is an adhesive.

13. The apparatus of claim 12 wherein the adhesive is plant resin.

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## APPENDIX D

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# Selected Statutes and Regulations

The provisions of 35 U.S.C. and 37 C.F.R. below are cited in the main text.

### 35 U.S.C.

#### **Sec. 101. Inventions patentable**

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.

#### **Sec. 102. Conditions for patentability; novelty and loss of right to patent**

A person shall be entitled to a patent unless—

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or
- (c) he has abandoned the invention, or
- (d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States, or
- (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent, or
- (f) he did not himself invent the subject matter sought to be patented, or
- (g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

**Sec. 103. Conditions for patentability; non-obvious subject matter**

- (a) 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 negated by the manner in which the invention was made.
- (b) [Specific provisions relating to biotechnological inventions]
- (c) Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

**Sec. 112. Specification**

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

A claim may be written in independent or, if the nature of the case admits, in dependent or multiple dependent form.

Subject to the following paragraph, a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.

A claim in multiple dependent form shall contain a reference, in the alternative only, to more than one claim previously set forth and then specify a further limitation of the subject matter claimed. A multiple dependent claim shall not serve as a basis for any other multiple dependent claim. A multiple dependent claim shall be construed to incorporate by reference all the limitations of the particular claim in relation to which it is being considered.

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

**Sec. 120. Benefit of earlier filing date in the United States**

An application for patent for an invention disclosed in the manner provided by the first paragraph of section 112 of this title in an application previously filed in the United States, or as provided by section 363 of this title, which is filed by an inventor or inventors named in the previously filed application shall have the same effect, as to such invention, as though filed on the date of the prior application, if filed before the patenting or abandonment of or termination of proceedings on the first application or on an application similarly entitled to the benefit of the filing date of the first application and if it contains or is amended to contain a specific reference to the earlier filed application.



**Sec. 121. Divisional applications**

If two or more independent and distinct inventions are claimed in one application, the Commissioner may require the application to be restricted to one of the inventions. If the other invention is made the subject of a divisional application which complies with the requirements of section 120 of this title it shall be entitled to the benefit of the filing date of the original application. A patent issuing on an application with respect to which a requirement for restriction under this section has been made, or on an application filed as a result of such a requirement, shall not be used as a reference either in the Patent and Trademark Office or in the courts against a divisional application or against the original application or any patent issued on either of them, if the divisional application is filed before the issuance of the patent on the other application. If a divisional application is directed solely to subject matter described and claimed in the original application as filed, the Commissioner may dispense with signing and execution by the inventor. The validity of a patent shall not be questioned for failure of the Commissioner to require the application to be restricted to one invention.

**Sec. 132. Notice of rejection; reexamination**

Whenever, on examination, any claim for a patent is rejected, or any objection or requirement made, the Commissioner shall notify the applicant thereof, stating the reasons for such rejection, or objection or requirement, together with such information and references as may be useful in judging of the propriety of continuing the prosecution of his application; and if after receiving such notice, the applicant persists in his claim for a patent, with or without amendment, the application shall be reexamined. No amendment shall introduce new matter into the disclosure of the invention.

**Sec. 251. Reissue of defective patents**

Whenever any patent is, through error without any deceptive intention, deemed wholly or partly inoperative or invalid, by reason of a defective specification or drawing, or by reason of the patentee claiming more or less than he had a right to claim in the patent, the Commissioner shall, on the surrender of such patent and the payment of the fee required by law, reissue the patent for the invention disclosed in the original patent, and in accordance with a new and amended application, for the unexpired part of the term of the original patent. No new matter shall be introduced into the application for reissue.

The Commissioner may issue several reissued patents for distinct and separate parts of the thing patented, upon demand of the applicant, and upon payment of the required fee for a reissue for each of such reissued patents.

The provisions of this title relating to applications for patent shall be applicable to applications for reissue of a patent, except that application for reissue may be made and sworn to by the assignee of the entire interest if the application does not seek to enlarge the scope of the claims of the original patent.

No reissued patent shall be granted enlarging the scope of the claims of the original patent unless applied for within two years from the grant of the original patent.

**Sec. 252. Effect of reissue**

The surrender of the original patent shall take effect upon the issue of the reissued patent, and every reissued patent shall have the same effect and operation in law, on the trial of actions for causes thereafter arising, as if the same had been originally granted in such amended form, but in so far as the claims of the original and reissued patents are identical, such surrender shall not affect any action then pending nor abate any cause of action

then existing, and the reissued patent, to the extent that its claims are identical with the original patent, shall constitute a continuation thereof and have effect continuously from the date of the original patent.

A reissued patent shall not abridge or affect the right of any person or that person's successors in business who, prior to the grant of a reissue, made, purchased, offered to sell, or used within the United States, or imported into the United States, anything patented by the reissued patent, to continue the use of, to offer to sell, or to sell to others to be used, offered for sale, or sold, the specific thing so made, purchased, offered for sale, used, or imported unless the making, using, offering for sale, or selling of such thing infringes a valid claim of the reissued patent which was in the original patent. The court before which such matter is in question may provide for the continued manufacture, use, offer for sale, or sale of the thing made, purchased, offered for sale, used, or imported as specified, or for the manufacture, use, offer for sale, or sale in the United States of which substantial preparation was made before the grant of the reissue, and the court may also provide for the continued practice of any process patented by the reissue that is practiced, or for the practice of which substantial preparation was made, before the grant of the reissue, to the extent and under such terms as the court deems equitable for the protection of investments made or business commenced before the grant of the reissue.

#### **Sec. 271. Infringement of patent**

- (a) Except as otherwise provided in this title, whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent.
- (b) Whoever actively induces infringement of a patent shall be liable as an infringer.
- (c) Whoever offers to sell or sells within the United States or imports into the United States a component of a patented machine, manufacture, combination or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial noninfringing use, shall be liable as a contributory infringer.
- (d) [Provisions preserving patent owner's right to relief under certain circumstances]
- (e) [Provisions specifically relating to drugs and veterinary biological products]
- (f)
  - (1) Whoever without authority supplies or causes to be supplied in or from the United States all or a substantial portion of the components of a patented invention, where such components are uncombined in whole or in part, in such manner as to actively induce the combination of such components outside of the United States in a manner that would infringe the patent if such combination occurred within the United States, shall be liable as an infringer.
  - (2) Whoever without authority supplies or causes to be supplied in or from the United States any component of a patented invention that is especially made or especially adapted for use in the invention and not a staple article or commodity of commerce suitable for substantial noninfringing use, where such component is uncombined in whole or in part, knowing that such component is so made or adapted and intending that such component will be combined outside of the United States in a manner that would infringe the patent if such combination occurred within the United States, shall be liable as an infringer.

- (g) Whoever without authority imports into the United States or offers to sell, sells, or uses within the United States a product which is made by a process patented in the United States shall be liable as an infringer, if the importation, offer to sell, sale, or use of the product occurs during the term of such process patent. In an action for infringement of a process patent, no remedy may be granted for infringement on account of the noncommercial use or retail sale of a product unless there is no adequate remedy under this title for infringement on account of the importation or other use, offer to sell, or sale of that product. A product which is made by a patented process will, for purposes of this title, not be considered to be so made after—
  - (1) it is materially changed by subsequent processes; or
  - (2) it becomes a trivial and nonessential component of another product.
- (h)–(i) [Definitions]

**Sec. 273. Defense to infringement based on earlier inventor**

- (a) Definitions.—For purposes of this section—
  - (1)–(4) [Definitions]
- (b) Defense to Infringement.—
  - (1) In general.—It shall be a defense to an action for infringement under section 271 of this title with respect to any subject matter that would otherwise infringe one or more claims for a method in the patent being asserted against a person, if such person had, acting in good faith, actually reduced the subject matter to practice at least 1 year before the effective filing date of such patent, and commercially used the subject matter before the effective filing date of such patent.
  - (2) Exhaustion of right.—The sale or other disposition of a useful end product produced by a patented method, by a person entitled to assert a defense under this section with respect to that useful end result shall exhaust the patent owner's rights under the patent to the extent such rights would have been exhausted had such sale or other disposition been made by the patent owner.
  - (3) Limitations and qualifications of defense.—The defense to infringement under this section is subject to the following:
    - (A) Patent.—A person may not assert the defense under this section unless the invention for which the defense is asserted is for a method.
    - (B) . . .

**287. Limitation on damages and other remedies; marking and notice**

- (a) Patentees, and persons making, offering for sale, or selling within the United States any patented article for or under them, or importing any patented article into the United States, may give notice to the public that the same is patented, either by fixing thereon the word "patent" or the abbreviation "pat.", together with the number of the patent, or when, from the character of the article, this can not be done, by fixing to it, or to the package wherein one or more of them is contained, a label containing a like notice. In the event of failure so to mark, no damages shall be recovered by the patentee in any action for infringement, except on proof that the infringer was notified of the infringement and continued to infringe thereafter, in which event damages may be recovered only for infringement occurring after such notice. Filing of an action for infringement shall constitute such notice.
- (b) . . .

## 37 C.F.R.

### Sec. 1.75 Claim(s)

- (a) The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.
- (b) More than one claim may be presented provided they differ substantially from each other and are not unduly multiplied.
- (c) One or more claims may be presented in dependent form, referring back to and further limiting another claim or claims in the same application. . . . Claims in dependent form shall be construed to include all the limitations of the claim incorporated by reference into the dependent claim. A multiple dependent claim shall be construed to incorporate by reference all the limitations of each of the particular claims in relation to which it is being considered.
- (d)
  - (1) The claim or claims must conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description. (See Sec. 1.58(a).)
  - (2) See Secs. 1.141 to 1.146 as to claiming different inventions in one application.
- (e) Where the nature of the case admits, as in the case of an improvement, any independent claim should contain in the following order:
  - (1) A preamble comprising a general description of all the elements or steps of the claimed combination which are conventional or known,
  - (2) A phrase such as “wherein the improvement comprises,” and
  - (3) Those elements, steps and/or relationships which constitute that portion of the claimed combination which the applicant considers as the new or improved portion.
- (f) If there are several claims, they shall be numbered consecutively in Arabic numerals.
- (g) The least restrictive claim should be presented as claim number 1, and all dependent claims should be grouped together with the claim or claims to which they refer to the extent practicable.
- (h) The claim or claims must commence on a separate sheet.
- (i) Where a claim sets forth a plurality of elements or steps, each element or step of the claim should be separated by a line indentation.

### Sec. 1.83 Content of drawing

- (a) The drawing in a nonprovisional application must show every feature of the invention specified in the claims. . .

### Sec. 1.131 Affidavit or declaration of prior invention

- (a) When any claim of an application. . . is rejected, the inventor of the subject matter of the rejected claim. . . may submit an appropriate oath or declaration to establish invention of the subject matter of the rejected claim prior to the effective date of the reference or activity on which the rejection is based. . . . Prior invention may not be established under this section if either:

- (1) The rejection is based upon a U.S. patent or U.S. patent application publication of a pending or patented application to another or others which claims the same patentable invention. . . ; or
- (2) The rejection is based upon a statutory bar.
- (b) The showing of facts shall be such, in character and weight, as to establish reduction to practice prior to the effective date of the reference, or conception of the invention prior to the effective date of the reference coupled with due diligence from prior to said date to a subsequent reduction to practice or to the filing of the application. . . .

**Sec. 1.132 Affidavits or declarations traversing rejections or objections**

When any claim of an application or a patent under reexamination is rejected or objected to, any evidence submitted to traverse the rejection or objection on a basis not otherwise provided for must be by way of an oath or declaration under this section.

**Sec. 1.321 Statutory disclaimers, including terminal disclaimers**

- (a) A patentee owning the whole or any sectional interest in a patent may disclaim any complete claim or claims in a patent. In like manner any patentee may disclaim or dedicate to the public the disclaimer is binding upon the grantee and its successors or assigns. A notice of the disclaimer is published in the Official Gazette and attached to the printed copies of the specification. . . .
- (b) An applicant or assignee may disclaim or dedicate to the public the entire term, or any terminal part of the term, of a patent to be granted. Such terminal disclaimer is binding upon the grantee and its successors or assigns. . . .
- (c) A terminal disclaimer, when filed to obviate a judicially created double patenting rejection in a patent application or in a reexamination proceeding, must:
  - (1) Comply with the provisions of paragraphs (b)(2) through (b)(4) of this section;
  - (2) Be signed in accordance with paragraph (b)(1) of this section if filed in a patent application or in accordance with paragraph (a)(1) of this section if filed in a reexamination proceeding; and
  - (3) Include a provision that any patent granted on that application or any patent subject to the reexamination proceeding shall be enforceable only for and during such period that said patent is commonly owned with the application or patent which formed the basis for the rejection.



# Glossary

This glossary will be principally of interest to inventors or other non-patent practitioners who may pick up this book. Patent practitioners are already intimately familiar with the terms herein, with the possible exception of the terms “claim family,” and “claim suite” and the book’s somewhat unconventional use of the term “prior art” as encompassing subject matter defined by both 35 U.S.C. 102 and 35 U.S.C. 103.

Terms in *italic* are terms defined in the glossary itself.

**Anticipated** Said of a *claim* that reads on the prior art. A claim that is anticipated will be either *unpatentable* or *invalid*.

**Broad** Said of a *claim* with relatively few *limitations*, thereby causing the claim to encompass a wider range of implementations of the *inventive concept*. Such a claim is said to be of broad “scope.” (Compare with *narrow*.)

**Claim** A single sentence, arranged in one or more paragraphs, defining what a patent owner has exclusive rights to. (See *infringement*.)

**Claim Family** Set of *claims* consisting of one *independent* claim and all of its *dependent* claims.

**Claim Suite** Entire set of *claims* in a *patent*—that is, the collection of all of its claim families.

**Dependent Claim** A *claim* that refers to another *dependent* or *independent* claim (*parent*) in such a way as to incorporate the parent’s limitation into *this* claim.

**Embodiment** Method, apparatus, or composition of matter that implements the *inventive concept*.

**Indefinite Claim** *Claim* having one or more *limitations* that render it not possible to determine with reasonable certainty when the claim would be *infringed*.

**Independent Claim** A *claim* that does not refer to, and thus does not incorporate the limitations of, any other claim.

**Infringed, Infringement** A *claim* is infringed when an accused method, apparatus, or composition of matter meets every limitation in the claim. A patent is infringed when at least one of its claims is infringed.

**Infringer** Any party who *practices* a patented invention without authority from the patent owner to do so.

**Intellectual Property (IP)** Knowledge and ideas amenable to legal protection. Inventions are a form of intellectual property and are protected by patents. Other forms of intellectual property include literary and artistic works, product names, and business information, which are protected by copyrights, trademarks, and trade secret law, respectively.

**Invalid Claim** Said of an *overbroad* or *indefinite claim* in an *issued patent*. (Compare with *unpatentable*.)

**Inventive Concept** The essence of what makes a particular invention different from the *prior art*. The inventive concept of the original ballpoint pen, for example, is the fact that it had a spheroidal marking point.

**Limitation** A word or phrase in a *claim*.

**Narrow** Said of a *claim* with a relatively large number of *limitations*, thereby causing the claim to encompass a smaller range of implementations of the *inventive concept*. Such a claim is said to be of narrow “scope.” (Compare with *broad*.)

**Parent** *Claim* to which a *dependent* claim refers, thereby incorporating the limitations of the *parent* claim into the dependent claim.

**Patent, Issued Patent** Government-issued document giving its owner the right to exclude others, for a proscribed period of time, from making, using, offering for sale, selling, or importing an invention.

**Patent Application** The *specification*, *claims*, drawings, and formal papers submitted to the Patent and Trademark Office with the goal of obtaining an *issued patent*.

**Pending** *Patent application* has been submitted to the Patent and Trademark Office, but it has not yet issued a patent.

**Practice (an invention)** One practices a patented invention by making, using, selling, offering for sale, or importing a method, apparatus, or composition of matter that *infringes* at least one of the patent’s *claims*.

**Preamble** The introductory words of a *claim*.

**Prior Art** The body of information published or known by those working in a technical field—normally associated with subject matter defined in various subsections of 35 U.S.C. 102. This book also uses the term



“prior art” to include subject matter that would have been obvious to those of ordinary skill in the art per 35 U.S.C. 103.

**Read on** A claim “reads on” *prior art* when all of the *limitations* in the *claim* can be found in that prior art.

**Specification** Portion of a *patent application* that describes the *inventive concept* and its embodiments.

**Unpatentable** Said of an *overbroad* or *indefinite claim* in a *pending patent* application. (Compare with *invalid*.)



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