

Drafting Patent Claims for use in the United States in Mechanical and Electrical Cases

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This booklet has been written primarily for use by foreign patent practitioners who prepare U.S. patent applications on occasion. It is hoped that the booklet may also be helpful to independent inventors in the United States. The opinions expressed in the booklet are solely those of the author, and do not necessarily represent the views of his firm.

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Section 1 – How Claims are Used

This booklet could begin with a list of formal rules and examples of typical American claim language. The trouble is, some of these rules may appear arbitrary or confusing if they are considered in isolation. A better appreciation for the philosophy behind American patent claims can be gained if one begins instead with an example of how patent claims for electrical and mechanical inventions are interpreted by the U.S. Patent and Trademark Office and by the courts. Chemistry by its very nature is less predictable than electrical or mechanical devices, and consequently chemical claims tend to differ in several significant respects from electrical and mechanical claims, so they will not be covered in this booklet.

Inventors typically build on advances made by earlier inventors. This means that a realistic example would need to be fairly complex if it were presented in the context of today's world. Such complexity is not necessary for present purposes and can be avoided by mentally traveling back in time to an earlier age, at the dawn of technology. It will nevertheless be assumed that modern American patent law is applicable.

So... go back mentally about ten thousand years, to the end of the last Ice Age. The glaciers were receding, the weather was growing warmer, and food could be found almost everywhere. Gone were those cold and hungry centuries when small families shivered in isolation as they trekked across the frozen tundra in constant search of anything edible. Even encounters with those pesky saber tooth tigers were becoming rare. Life was good.

But the Council of Elders thought that life could become even better. In order to promote the progress of science and the useful arts (a phrase that would show up many centuries later in the U.S. Constitution), the Council decided to grant a patent to anyone who developed something new if the development was more than a mere routine change from what had been done in the past. The patent would permit the inventor to keep others from making, using, selling, or even offering for sale the invention defined by the patent's claims. The Council reasoned that this reward would stimulate members of the tribe to be creative, and also to reveal their ideas so that they could be freely used by the entire tribe after the patent expired. After long hours of debate around the Eternal Campfire, which symbolized the permanence of the tribe's settlement in contrast to the nomadic wandering of the past, the Council of Elders also decided that an inventor would lose his right to seek a patent if he revealed his invention to the tribe but then failed to file an application within a year.

The Council of Elders established the Stone Age Patent Office (SAPO) to implement its policies. One of the first applicants was a Mr. Smith, who invented an arrangement that he called a "stool" for people to sit on instead of the rocks and logs they had been accustomed to sitting on previously. It is illustrated in Figure 1 (next page), and included a plank 2 that had been split from a short segment of a log using a flint ax. Three notches 4 were cut in the edges of plank 2 using a stone knife. Mr. Smith prepared three legs 6 by chopping branches to an appropriate length and wrapping a leather strip 8 around each branch near its upper end. Mr. Smith then wedged the branches 6 into the notches 4, with the leather strips 8 keeping the plank 2 from sliding downward when a person sat on the plank 2. To make his stool sturdy, Mr. Smith used three braces 10, which he lashed to the legs 6 using leather strips 12.

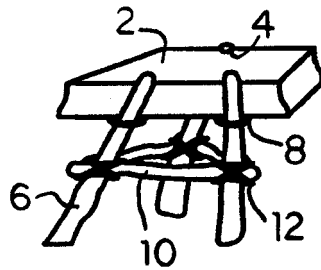


Fig. 1

Mr. Smith's stool was fabulously successful. No longer was it necessary for a person to fetch a heavy log when he wanted to sit; simply carry the stool to the desired location. Mr. Smith continued making stools until his patent expired, and was then able to retire to a life of luxury.

Mr. Todd had been lazy as a child and remained lazy as an adult. But he was inventive. While drinking mead at Mr. Smith's retirement party, Mr. Todd conceived the notion of modifying a stool so that even the minimal effort required for sitting upright could be reduced. A back rest to lean against would do the trick. After recovering from the party Mr. Todd retreated to his workshop in a nearby cave and built what he called a "chair," as shown in Figure 2. He promptly thereafter applied to SAPO for a patent.

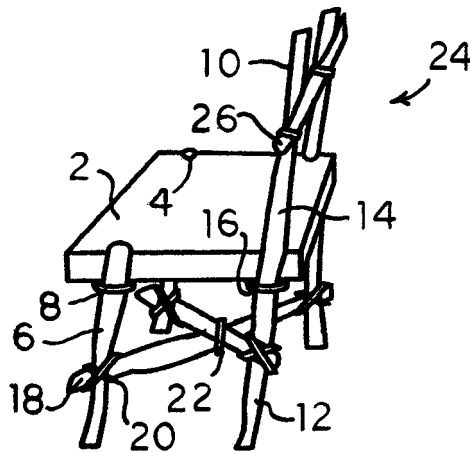


Fig. 2

Mr. Todd's chair included a plank 2 having four notches 4 cut into its edges. Front legs 6 were wedged into the front notches and were wound with leather strips 8 just below the notches. Mr. Todd's chair also included two poles 10 that were wedged into the rear notches. Each pole 10 had a lower portion 12 that served as a rear leg and an upper portion 14 that extended above the plank 2. Leather strips 16 were wound around the poles 12 just below the notches. Two braces 18 were used. Each was lashed to one of the front legs 6 and to one of the portions 12 with a leather strip 20. The braces 18 were also lashed together with a leather strip 22. A backrest structure 24 was attached to the plank 2. It was formed by the upper portions 14 of the poles and a cross member 26 that was lashed to the upper portions 14 by leather strips.

The broadest claim that was present in Mr. Todd's application when he filed it was:

1. (Original) An apparatus for supporting a person in a sitting position above a surface, comprising:
a plank having a top side and a bottom side;

a plurality of elongated leg members, the leg members being connected to the plank and extending downward from the bottom side of the plank to elevate the plank above the surface; and

a structure connected to the plank and extending upward from the top side of the plank to rest the person's back against as the person sits on the top side of the plank.

SAPO assigned Mr. Todd's application to Examiner Jones, who "acted" on the application by reading it, conducting a search of the prior art, and issuing an Office Action that rejected Mr. Todd's claim 1 for obviousness on the basis of Mr. Smith's stool (Figure 1) in view of a seating arrangement that had long been employed at the meeting place of the Council of Elders. This arrangement is shown in Figure 3. During their deliberations, the Elders sat on logs 2 that were arranged in a ring around the eternal campfire, designated by reference number 4. By tradition, the logs 2 were lashed to trees 6 by leather strips 8. According to legend, this tradition arose because the children who were assigned to mind the eternal campfire in earlier years had occasionally rolled the logs 2 into the fire instead of foraging in the forest for firewood. The Elders stopped this mischief by tying their logs 2 to the trees 6.

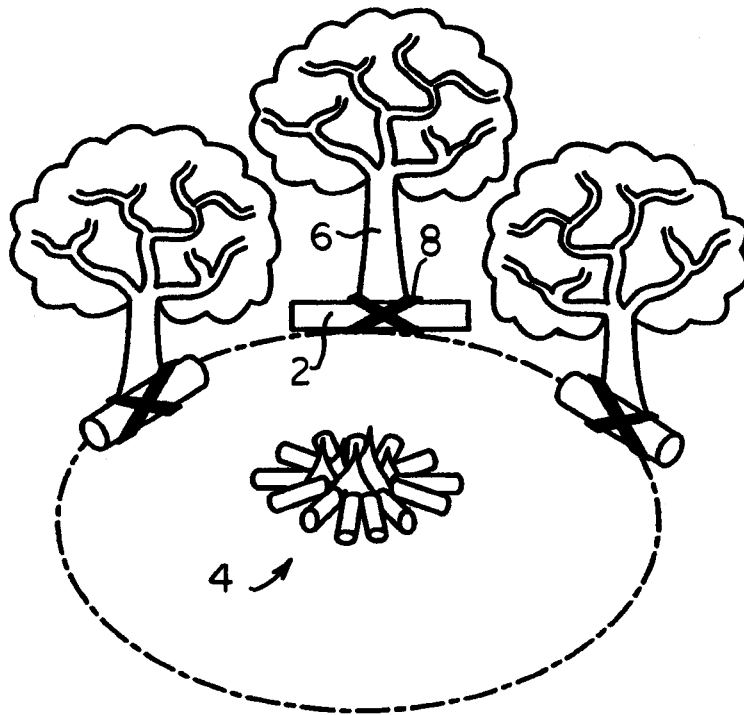


Fig. 3

Mr. Todd was outraged when he received the Office Action. He promptly made an appointment to discuss it with Mr. Jones at an Office Interview. Couldn't the Examiner see that his chair was completely different from a log lashed to a tree?

Mr. Todd was surprised at the interview to find that Mr. Jones readily acknowledged that the chair disclosed in his application was considerably different from the seating arrangement employed by the elders. "But what you've *claimed* is not all that different," he continued. "Smith's prior art stool has the plank of your claim 1 and the leg members, too. Smith's stool is

similar to a log because you can sit on either, and if you replace a log at the Elders' meeting place with Smith's stool what you would have is a stool lashed to a tree. The Elders have been known to lean back against their trees. Since this is during prosecution and you have an opportunity to amend your claims if you want, I am going to interpret the 'structure ... to rest the person's back against as the person sits on the top side of the plank' recited in your claim 1 broadly as encompassing a tree. Your claim 1 'reads on,' or accurately describes, a stool (instead of a log) lashed to a tree."

Mr. Todd pondered the Examiner's comments after his return home. Several days later he filed an Amendment which revised claim 1 to read as follows:

1. (Amended) A apparatus for supporting a person in a sitting position above a surface, comprising:
 - a plank having a top side and a bottom side;
 - a pair of poles connected to the plank, each pole having a lower portion which extends downward from the bottom side of the plank to provide a first leg member and having an upper portion which extends upward from the top side of the plank;
 - at least one second leg member connected to the plank and extending downward from the bottom side of the plank, the first leg members and at least one second leg member elevating the plank above the surface; and
 - a cross member connected to the upper portions of the poles for the person to lean back against as the person sits on the top side of the plank.

In his Amendment, Mr. Todd argued that his amended version of claim 1 did not read on a stool tied to a tree. He also argued that using a pole to provide both a leg member and an upper portion to which a cross member is connected essentially uses the leg member to brace the upper portion, so that it will hold the cross member steady when the person leans back. These arguments persuaded the Examiner, who authorized a patent.

Mr. Todd's chairs were selling well. So well, in fact, that it attracted the attention of Mr. White, who studied Mr. Todd's patent in an attempt to design around it. He soon started selling his own chairs, one of which is shown in Figure 4 (next page). It included a plank 2 with six notches in its edges. Two front legs 4 were wedged in the front notches and wound with leather strips just below the notches. The front legs had upper portions 6 which extended above the plank 2. Two back legs 8 were wedged in notches toward the rear of the plank 2. They were wound with leather strips just below the notches. Two braces 10 were criss-crossed beneath the plank and lashed to the front and rear legs with leather strips. The braces 10 were also lashed together where they crossed with a leather strip. Two short poles 12 were wedged into the final two notches, at the back edge of plank 2. They were wound with leather strips just above the notches to keep them from sliding down. A cross member 14 was lashed to the poles 12 to serve as a back rest for the chair. Two braces 16, which also served as arm rests, were lashed to the upper portions 6 and to the poles 12.

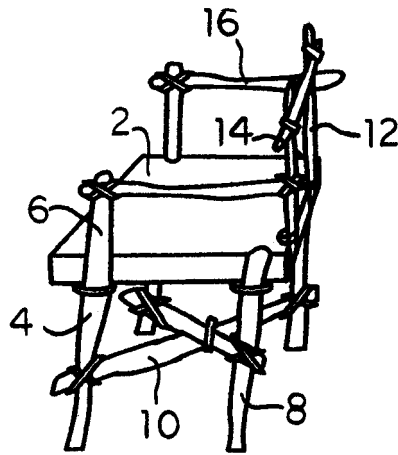


Fig. 4

Mr. White's chairs sold well enough to cut painfully into Mr. Todd's sales. Mr. Todd sued for patent infringement. Mr. Todd argued that he invented the idea of adding a back rest to a stool and that even if Mr. White went beyond that with trivial gimmicks such as arm rests, Mr. White should not be permitted to use a back rest on a four-legged stool.

The judge relied upon claim 1 in Mr. Todd's patent to resolve the infringement controversy. Glancing back and forth between a copy of patent claim 1 and Mr. Todd's chair (Figure 4), the judge decided that Mr. White's chair was indeed "An apparatus for supporting a person in a sitting position above a surface." Mr. White's chair also included a "plank" 2. Mr. White's chair additionally had "a pair of poles" (legs 4 and their upper portions 6) connected to the plank 2, with "each pole having a lower portion which extends downward from the bottom side of the plank to provide a first leg member and having an upper portion which extends upward from the top side of the plank." The judge likewise found that Mr. White's chair included "at least one second leg member (8) connected to the plank (2) and extending downward from the bottom side of the plank, the first leg members (4) and at least one second leg member (8) elevating the plank (2) above the surface." Furthermore, the judge concluded that Mr. White's chair included a "cross member" (14) for a sitting person to lean back against. However the judge determined that claim 1 of Mr. Todd's patent did not "read on" Mr. White's chair, and thus was not literally infringed by the chair, since Mr. White's cross member 14 was *not* "connected to the upper portions of the poles" as specified by claim 1. The judge also ruled that connecting arm rests to the upper portions of poles whose lower portions serve as leg members (as Mr. White had done) was not equivalent to connecting the cross member of a back rest to the upper portions of poles. Mr. Todd left court an unhappy man.

* * * * *

Two important lessons can be drawn from this example. One is that a U.S. claim is *not* an explanation of the invention or an attempt at verbalizing what might be called the "heart" of the invention. Instead, a U.S. claim is more like a checklist of components (or method steps) that all need to be present in an accused device (or method) for the claim to be literally infringed by the accused device. Each component listed in a claim (frequently called an "element" of the claim) must also be verbally linked, functionally or structurally, to at least one other component specified in the claim. This requirement is sometimes said to be present in order to keep the claim from reading on a box full of loose parts by accident. However, the requirement for such verbal

connections between components (or method steps) is not at all the same as a requirement for a narrative explanation in the claim of how the invention works.

Different countries have different requirements for their patent claims. The United States employs an approach to patent claims that is called “peripheral claiming,” where a claim defines the outer limits or boundary of an invention and the issue during a lawsuit for infringement is whether the accused device falls inside the boundary or outside. A checklist of what must be present in an accused device for there to be infringement goes a long way toward establishing the boundary between what is protected and what is not.*

A corollary to this is that the larger the checklist, the narrower the claim. Consider a first claim that specifies (or, in patent parlance, “recites”) an element A, an element B connected to the A, and an element C connected to the B. This first claim is broader than a second claim that recites an A, a B connected to the A, a C connected to the B, and also a D connected to the C. The reason is that the second claim recites everything in the first claim, but also requires the presence of an element D that is connected to one of the elements recited in the first claim (specifically, the element C). The first claim is also broader than a third claim that recites an A, a B bolted to the A, and a C glued to the B, since the first claim uses the more general term “connected” without restrictions on the nature of the connection (“bolted,” “glued”). The elements recited in a claim and the connections between elements are frequently referred to as “limitations,” since they limit the scope of the claim.

The second lesson to be learned from this example is that patent examiners *examine claims*. Yes, they do indeed read the application, but their conclusions about patentability over the prior art are based on the claims rather than the descriptive portion of the application. It is not enough for an invention as-described in the application to be new and non-obvious, since the examiner’s decisions will be based on the invention *as claimed*. The examiner is justified in construing the language of your claims as broadly as is reasonably possible during prosecution unless your application defines the terms used in the claims in a more limited manner. For example, Examiner Jones in the above example would have been justified in interpreting the “cross member” in Mr. Todd’s claim as a piece of hide stretched between the upper portions of the poles if he had located prior art showing this during his search. The burden would then have been on Mr. Todd to narrow his claim to exclude the piece of hide or to make other changes that would avoid the prior art.

* If a patent claim “reads on” or accurately describes an accused device, the device is said to “literally infringe” the claim. In this situation, the accused device lies inside the verbal boundary established by the claim. It is also possible, in some limited circumstances, for an accused device to infringe under the so-called “doctrine of equivalents” if the accused device lies outside the verbal boundary but close to it. In both types of infringement, though, the starting point is the verbal boundary established by the claim.

Section 2 -- Anatomy of a Claim

Let's have a closer look at claim 1 of Mr. Todd's patent, which was introduced in the preceding section of this booklet. The phrase "An apparatus for supporting a person in a sitting position above a surface" is called the "preamble." Its main function is to introduce what follows by providing a name or brief description of the invention that will be defined in the main portion of the claim. The preamble of Mr. Todd's claim provides a brief description, since the word "chair" undoubtedly did not exist as a name for this type of object before Mr. Todd invented the first chair. Had chairs existed before Mr. Todd's invention, the preamble could have been simply "A chair." The preamble of a claim can also be used as a repository for terms that will be used in the main portion of the claim. This will be discussed in more detail later in this booklet (see Section 4).

The word "comprising" in Mr. Todd's claim is called the "transition." It marks the end of the preamble and the beginning of the main portion of the claim. In American patents, "comprising:" is understood to mean "including at least the following, and possibly other things in addition." Depending upon the grammar employed in the claim, "which comprises:" may be used instead of "comprising:". Although "comprising:" (or "which comprises:") is by far the most common transition used in the United States for claims directed to mechanical and electrical inventions, "including:" (or "which includes:") may sometimes be used instead.

Only in exceptional cases should the transition "consisting of:" be used in claims directed to mechanical or electrical inventions. This is a transition that is frequently used in the United States for claims directed to chemical inventions, and has come to be interpreted as meaning "including what follows but little or nothing else." Similarly, transitions such as "which consists of:" or "consisting essentially of:" should rarely be used in claims directed to mechanical or electrical inventions.

The main portion of the claim is what follows the transition. It is more formally known as the "body" of the claim, and defines the invention by listing the elements of the invention and, for each element, at least one relationship between that element and some other element in the claim. The claim in Mr. Todd's patent is a so-called "apparatus claim" (in contrast to a "method claim," which will be discussed later in Section 9), since the elements of the claim are structural in nature. The elements in Mr. Smith's claim are a "plank," a "pair of poles," at least one "second leg member," and a "cross member." The claim specifies that the poles are related to the plank by being connected to the plank in such a manner that each pole has a portion that extends downward from the bottom of the plank, and another portion that extends upward from the top side of the plank. The claim also specifies a relationship between the at least one second leg member and the plank, and a relationship between the cross-member and the poles. A further relationship specified in the claim is that the lower portions of the poles (also called "first leg members") and the at-least-one second leg member elevate the plank.

These elements and relationships provide the checklist for gauging patentability and infringement, as discussed in Section 1 of this booklet. The elements and relationships specified in a claim are called "limitations," as was also mentioned in Section 1, and each of them adds an entry to the checklist. This is the reason why skillful claims drafters avoid reciting unnecessary elements in the broadest claims, and are very careful about what relationships are recited. The point was made in Section 1 that patent claims in the United States do not need to explain how or why an invention works. It sometimes happens that the relationships that are recited in a claim

tend to convey such an explanation, but this should be only incidental, and not intentional. Intentionally weaving an explanation of operation into a claim can encumber the claim with unnecessary limitations, particularly if the claim needs to be revised during prosecution (that is, during the course of examination at the U.S. Patent and Trademark Office, or USPTO) in response to a rejection for indefiniteness regarding terms used in the explanation. As will be discussed later in this booklet, certain restrictions exist in how terminology can be used in American claims, and violation of these restrictions (which is easy to do when one attempts to present a concise explanation of how or why an invention works) can lead to a rejection for indefiniteness.

The claim in Mr. Todd's patent is called an "independent claim" because it does not refer to any other claims. Grammatically, it is part of a single sentence (although a complex one) that ends in a period. The other part of the sentence is its beginning, which can be assumed rather than expressly set forth. The beginning of this sentence, assumed or otherwise, can be "What I claim is:" or "What we claim is:" (if there are joint inventors), or "The invention for which patent protection is claimed is:" and so forth. However the beginning of the sentence is expressed, the total sentence means that patent protection is claimed for whatever is named in the preamble of the claim if that "whatever" comprises what is specified in the body of the claim.

Independent claims are called that in order to distinguish them from dependent claims. They will be discussed in the next section of this booklet.

Section 3 – Dependent Claims

A dependent claim refers to another claim and builds on it. Suppose, for example, that claim 1 of some patent is an independent claim that recites "A tool, comprising: an element A, an element B connected to the element A, and an element C connected to the element B." Also suppose that claim 2 builds upon claim 1 by reciting "The tool of claim 1, further comprising: an element D connected to the element C." Claim 2 is said to "depend from" claim 1 and is interpreted as reciting everything that appears in claim 1 and claim 2 together. Dependent claim 2 is equivalent to an independent claim that recites "A tool, comprising: an element A, an element B connected to the element A, an element C connected to the element B, and an element D connected to the element C."

It should be apparent that a competitor's tool cannot infringe claim 2 unless it also infringes claim 1. If the competitor's tool is missing element A, for example, it doesn't matter whether it has elements B, C, and D. Similarly there would be no infringement if the competitor's tool has elements A, B, C, and D, but the A in the competitor's tool is not connected to the element B.

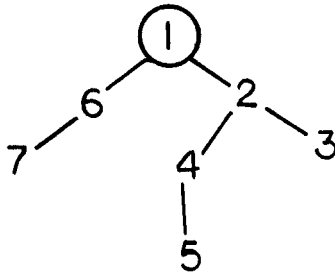
So why bother with dependent claims at all? What good are dependent claims in a patent if, to infringe them, a competitor must necessarily infringe an independent claim? The answer to these questions is that infringement is not the only factor that needs to be considered. Infringement is determined on the basis of the claims, but so is patentability. A range of claims are typically presented in a patent application so that, if it turns out that the prior art precludes patentability of the broader claims, the patent applicant may still be entitled to a patent for the narrower claims. In the event that a lawsuit becomes necessary to enforce the patent against a competitor, the competitor will be entitled to challenge the validity of the patent on the ground that the patent was not issued in compliance with the U.S. patent laws. Since the U.S. patent laws require patentability over the prior art, and since a competitor in a vigorously contested lawsuit will typically commission patent searches that are far more exhaustive than the Examiner's search during prosecution of the application that resulted in the patent in suit, it sometimes happens that an independent claim is knocked out during litigation but the competitor is still snared by one or more dependent claims.

Claims may depend not only from independent claims, like claim 2 in the above example, but from other dependent claims. It is not uncommon for several chains of dependent claims to depend from the same independent claim, or for a dependent claim to be the head of several chains of dependent claims. Here is an example:

1. A tool, comprising: ...
2. The tool of claim 1, further comprising...
3. The tool of claim 2, wherein...
4. The tool of claim 2, wherein...
5. The tool of claim 4, further comprising...
6. The tool of claim 1, further comprising...
7. The tool of claim 6, wherein...

The set of claims in this example can be diagrammed as shown in Figure 5 (where claim 1 is circled to indicate that it is an independent claim).

Fig. 5



It is good practice, when an application is prepared, to arrange the dependent claims so that one chain is completed before another is begun. It would be inappropriate to start building a chain of dependent claims, interrupt that chain to begin another chain, and then return to the first chain. This custom groups claims for easier consideration by the Examiner, at least during the initial examination. It frequently happens that the chains of dependency are disrupted during prosecution, though.

The official fees charged by the USPTO when an application is filed cover up to 20 claims, with three of these claims being independent. An "additional claim fee" must be paid if these limits are exceeded, either when the application is filed or during prosecution. The additional claim fee for an excess independent claim is several times higher than the additional claim fee for an excess dependent claim.

The USPTO did not permit multiply dependent claims before the advent of the Patent Cooperation Treaty. The USPTO began accepting them after the PCT, but only grudgingly. Multiply dependent claims are acceptable in the United States only if the multiple dependencies appear in the alternative. For example, "The tool of claim 1 *or* 2, further comprising...". "The tool of claim 1 *and* 2, further comprising..." or "The tool of any of the preceding claims, further comprising..." would not be acceptable. For purposes of the USPTO's official fees, a proper multiply dependent claim (that is, with the dependency specified in the alternative) counts as the same number of singly dependent claims that would be needed to replace the multiply dependent claim. On top of that, the USPTO charges a special fee if any multiply dependent claims are present at all. Because of these factors, it is common practice to avoid multiply dependent claims in the United States.

The claims in a U.S. patent application are numbered sequentially and retain their same claim numbers regardless of subsequent claim cancellations or amendments. For example, claim 4 remains claim 4 if claim 3 is canceled; it does not advance to claim 3.

The preamble of a dependent claim is normally the same as the preamble of its independent claim, or an abbreviated version of the preamble of the independent claim. For example, if the preamble of claim 1 is "An apparatus for supporting a person in a sitting position above a surface," suitable preambles for dependent claims would include "The apparatus for supporting a person according to claim 1" or simply "The apparatus of claim 1." Variations, such as "An apparatus according to claim 1," would also be acceptable. However, the same preamble should be used for all of the dependent claims associated with the same independent claim.

Section 4 – Antecedent Basis

Imagine that, in order to help build loyalty and team spirit among its employees, your company is sponsoring a company party where all employees are invited to bring their spouses and to socialize with other employees. You and your spouse enter together and migrate toward a crowd clustered around the bar waiting to receive drinks. You discover that your boss is also in the crowd waiting for a drink, so you take the opportunity to formally introduce your spouse. The introduction might go like this:

"Mr. Boss, I would like to introduce you to my wife Jane."

"How do you do, Jane?" responds the boss. "I almost feel that I know you already since your husband keeps your picture on his desk."

"You might be interested in knowing," you say to your boss, "that Jane attended the same university that your daughter is attending. Jane studied mathematics."

"Oh," says the boss, "it's a great university, and my daughter loves it. They have a fine math department, but my daughter hasn't yet made up her mind between math and chemistry."

We can now retreat from this company party and the conversation with the boss. But notice how the conversation proceeded. The boss, seeing the employee with his wife, waited to be formally introduced to her. After this formal introduction, the boss felt free to say to Jane that he was happy to meet her and to utter his little pleasantry about her picture on the desk. The employee then said something about Jane that might be of interest to the boss – that Jane attended the same university that his daughter is attending. This targeted the university, and particularly its math department, as a possible subject for further conversation.

There are several similarities between American patent claims and the conversation with the boss that was outlined above. Just as Jane was formally introduced to the boss, a claim must formally introduce each element that it specifies. This is called "positively reciting" the element, in contrast to "inferentially reciting" it. To formally introduce (or positively recite) a gear in a claim, for example, a claim would simply say "a gear." Having formally introduced the gear, the claim is then free to talk about *the* gear or *said* gear later on. If the claim were to talk about the gear without formally introducing it, there might be an inference that the gear is part of the invention that is being claimed (that is, an inferential limitation) but there would not be a positive assertion to this effect. The result would be uncertainty about whether the gear is part of the invention that is being defined by the claim.

Just as claims must positively recite elements, they must positively recite any features of the elements that are mentioned in the claim (with an exception that will be discussed below). For example, if the device that is disclosed in an application includes a gear and a switch that is located near the gear, so that the switch can be closed by a cam on the side of the gear every time the gear rotates, it would be improper for the claim to recite "a gear; and a switch mounted adjacent the gear for activation by *the* cam on the side of the gear." Instead, the claim should recite "a gear having a side and a cam on the side; and a switch mounted adjacent the gear for

activation by the cam." Such claim language positively recites the gear, and the cam as a feature of the gear.

Most U.S. examiners would accept a simple modification of "a gear, and a switch mounted adjacent the gear for activation by *the* cam on the face of the gear." If the article "the" is changed to "a," as in "a gear, and a switch located adjacent the gear for activation by *a* cam on the face of the gear," the language "a cam" might be considered a delayed but nevertheless positive recitation. It is generally considered to be better practice, though, for a claim to positively recite an element, together with all of the features of that element that will be mentioned later in the claim, before proceeding to positively recite the next element.

When an element or feature of an element is mentioned in a claim without having been positively recited in the claim, this mention of the element or feature is said to lack an "antecedent basis" in the previous claim language. Such a lack is usually considered to make the claim indefinite. But a claim can also be indefinite if it is unclear which of several possible antecedents, positively introduced earlier, was intended. For example, if a claim properly recites a gear and later properly recites another gear, and then recites that "the gear" is made of aluminum, to which gear does the aluminum limitation apply?

It was mentioned earlier that there is an exception to the rule requiring positive recitation of features of elements. The exception is this: if an element necessarily has some feature, it is unnecessary to expressly state that the element has that feature. For example, a rod necessarily has a surface, so it would be proper for a claim to recite "a rod, and a hook attached to the surface of the rod."

It frequently happens that the body of a claim recites an element that interacts with something else that, for one reason or another, the drafter of the claim does not want to positively recite as an element of the invention. A first attempt at drafting a claim to a flashlight might go as follows:

A flashlight, comprising:
a tube;
a lamp;
a holder mounted on the tube to hold the lamp;
batteries in the tube; and
a switch mounted on the tube, the switch being
manually movable between on and off positions to
electrically connect the batteries to the lamp when
the switch is in its on position.

The problem here is that a competitor might sell the flashlight without the batteries, in which case all of the limitations of the claim would not be present until a purchaser of the flashlight inserts the batteries into the tube. The purchaser of the flashlight would therefore directly infringe the claim, but the competitor that made the flashlight has infringed it only indirectly. Since complications exist in a lawsuit for indirect infringement that are not present in a lawsuit for direct infringement, it would be desirable not to recite the batteries in the body of the claim. But how?

It would undoubtedly be possible to draft a claim to a flashlight without mentioning batteries at all. Perhaps details of the switch or the holder might be recited, but (depending upon the prior art) this might limit the scope of protection unnecessarily. It might also be possible to

recite terminals mounted at either end of the tube, and wiring that connects the switch and the lamp in series between the terminals. A more natural way to overcome the problem, though, would be to transfer the batteries from the body of the claim to the preamble. The result might be as follows:

A flashlight for use with batteries, comprising:
a tube to hold the batteries;
a lamp;
a holder mounted on the tube to hold the lamp; and
a switch mounted on the tube, the switch being
manually movable between on and off positions and
connecting the batteries to the lamp when in the on position.

In this example, placing the batteries in the preamble of the claim means that the claim can be directly infringed even if a competitor's flashlight is sold without the batteries. The batteries can still be mentioned in the body of the claim because an antecedent basis now exists in the preamble.

Many U.S. examiners would accept a claim as follows:

A flashlight, comprising:
a tube;
a lamp;
a holder mounted on the tube to hold the lamp; and
a switch mounted on the tube, the switch being
manually movable between on and off positions to
electrically connect batteries that are located in the tube to
the lamp when the switch is in its on position.

Here, the batteries are neither introduced in the preamble nor positively recited in the body of the claim as elements of the invention. Are batteries part of what must be present for direct infringement or not? It seems likely that a court, in a lawsuit for direct infringement, would conclude that the batteries do not need to be present and that the uncertainty about this is not so severe as to render the claim fatally indefinite. Nevertheless, most skillful claim drafters would probably prefer to place the batteries in the preamble of the claim.

Patent examiners in the United States, when considering patentability over the prior art, are justified in ignoring language in the preamble if the language only specifies the intended use of the invention. For example, a claim directed to "an amplifier for a microwave signal, comprising" various elements and verbal linkages between them, could legitimately be rejected if the Examiner's search uncovers the same elements and linkages present in prior art audio amplifiers. It would do no good to argue against such a rejection on the ground that your client's amplifier is a microwave amplifier, not an audio amplifier. The examiner would reply that it makes no difference, since the structure recited in the claim is the same (or obvious) and it is only the intended use that is different. The only way to avoid the rejection would be to add limitations to the recited structure that would not be present (or obvious) in an audio amplifier.

This raises a question about whether an examiner might likewise be justified in ignoring the batteries in our flashlight claim if they are shifted to the preamble. Are batteries a mere statement of the intended use of the flashlight? The answer is "no," because they are relied on by recitations in the body of the claim.

Section 5 – How Legal Authorities are Identified in the U.S.

It is now time for a brief digression from the main focus of this booklet— patent claims— in order to lay a foundation for legal expressions that will be used in Section 6. Moreover, the legal expressions that are explained in this section are frequently encountered in Office Actions.

Most federal (or national) laws of lasting importance in the United States are indexed into 50 "titles" of the "United States Code." The bankruptcy laws are grouped primarily in Title 11, for example, and laws concerning railroads are primarily grouped in Title 45. The patent laws (or statutes) are grouped primarily in Title 35, and are divided into sections that are identified by number. Most of these sections are of very limited interest, but a few (such as section 103, which sets forth the American formulation of the non-obviousness standard for patentability) are very important. Any particular section of the patent laws can be identified by specifying 35 USC (standing, of course, for "United States Code"), followed by the section number. Thus, the section of the U.S. patent laws that sets forth the non-obviousness test for patentability is 35 USC 103.

Some of the power of the U.S. Congress to make laws concerning patents has effectively been delegated to the Patent and Trademark Office. The USPTO has the authority to make rules in order to carry out the patent laws if various conditions are met, and these rules then have the force of the laws themselves. Other federal agencies also have rule-making authority, and the rules are grouped into numbered titles of what is called the "Code of Federal Regulations," or "CFR." Most rules concerning patents, copyrights, and trademarks are found in 37 CFR. Since 37 CFR contains rules pertaining to different subjects, the rules themselves are prefaced by part numbers that identify a particular subject. The patent rules are found in Part 1, so Patent Rule 56 would be identified as "37 CFR 1.56."

Many years ago, the USPTO established a training program for new examiners. Senior examiners delivered lectures to the new examiners, and their lecture notes were later gathered together. This collection of lecture notes was modified and supplemented over the years and, in time, became what is now known as the "Manual of Patent Examining Procedure," or "MPEP." Unlike 35 USC and 37 CFR, the MPEP does not have the force of law. Instead, it represents the instructions of an employer (the Patent and Trademark Office) to its employees (patent examiners). Nevertheless, the instructions in the MPEP are very frequently backed up by reference to patent laws or rules, or to court decisions, and in most cases provide an authoritative summary of the current state of the law even for those who are not patent examiners.

In addition to statutes and rules, court decisions provide an important source of legal authority in the United States. Under what is called the doctrine of *stare decisis*, a court confronting some issue of law should normally decide that issue in the same way it was decided in previous cases, if the relevant statutory law and rules have not changed in the meantime and if all else is equal. Court decisions are usually identified by naming the parties, telling where the decision was published, and providing information about the court and the date of the decision. For example, *Smith Co. v. Jones Corp.*, 20 USPQ2d 1000 (CAFC, 1990), would identify a decision in a lawsuit between the Smith Company and the Jones Corporation, decided in the year 1990 by the Court of Appeals for the Federal Circuit and published in volume 20 of a set of books called "U.S. Patents Quarterly, 2d Series," beginning at page 1000 of that volume. If one or more additional parties are on the same side of the lawsuit as the Smith Company, the designation would generally be "*Smith Co., et al.*" "Et al." is an abbreviation for the Latin phrase "et alia," meaning "and others."

Some judicial decisions concern only one party, rather than a dispute between two or more parties. In such a situation, the case would be known as "*In re Smith*" (here, Smith would be the name of a person, not a company) or "*Ex parte Smith*."

The USPTO has an excellent website at www.uspto.gov. Copies of U.S. patents can be downloaded, and a limited degree of searching is provided for patents issued since 1975. The MPEP, the patent statutes, and the patent rules are also available

Now we return to claim drafting, in Section 6.

Section 6 – Means and Functions

Functional language is frequently used in patent claims. Indeed, claims that adequately protect many electrical inventions might well be impossible to draft without using function language. In the past, functional language in patent claims has received a fair share of criticism by the courts of this country, though, and it is well to be aware of this history.

As far back as the middle of the 1800s, when telegraphy was the state of the art in electronic communications, the U.S. Supreme Court invalidated a claim in a patent to a printing telegraph. This claim sought to protect "... the use of the motive power of the electric or galvanic current, which I call electro-magnetism, however developed for making or printing intelligible characters, letters, or signs, at any distances...". Such a claim would, of course, cover many developments at the forefront of technology today. In *O'Reilly v. Morse*, 56 U.S. 62 (1853), the court invalidated this claim on the ground that it merely specified a desirable outcome that was to be achieved with the device, regardless of the structure for achieving it. The court concluded that the claim was broader than the invention warranted. More recently, in *Halliburton Oil Well Cementing Co. v. Walker*, 329 U.S. 1 (1946), the U.S. Supreme Court invalidated a claim that recited the most crucial element an invention as a "means" for performing a broadly recited function. That is, it was this functional language rather than structural elements recited in the claim that distinguished the claim from the prior art, and the court felt that the patentee was only entitled to protection for the patentee's particular way of achieving that function. The scope of protection that was claimed was therefore broader than the invention merited.

It should not be assumed that the two cases discussed above were the only ones during this century-long period that considered patent claims with functional language. The courts in this country, in addition to casting a skeptical eye on functional language in claims because it might lead to claims that were broader than the invention warranted, also occasionally found fault with functional language for other reasons. An apparatus claim should define an invention in terms of what it is rather than what it does, one theory went, so functional language in claims was ignored in some cases when determining patentability over the prior art. In other cases, functional language was considered to lead to indefiniteness if the recited function did not necessarily follow from structural limitations recited in the claims.

The theory that an apparatus claim should define an invention solely in terms of structure has been thoroughly refuted by the Court of Appeals for the Federal Circuit, which is now the chief patent court in the United States (the Supreme Court has the last say, but the number of patent cases accepted by the Supreme Court is relatively small). One reason for this is the recognition that the theory implies a distinction between physical structures and the functions they perform, and this distinction is an artificial one. To specify what a structure does is to specify something about the structure itself. For example, if a claim were to recite "... a band around the first and second rods to hold the first and second rods together without slippage," the functional language "to hold the first and second rods together with slippage" means that the band must be strong enough to exert a compressive force on the rods.

In reaction to the Supreme Court's decision in *Halliburton*, mentioned above, the U.S. Congress enacted a law that now appears as the sixth paragraph of 35 USC 112. This law provides that "[a]n 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." This law expressly authorizes elements to be claimed in terms of what can be called "means-plus-function," and avoids the Supreme Court's concern that such language might lead to claims that are broader in scope than the invention justifies. The law does this by limiting what is covered by the means-plus-function clause to what is disclosed in the patent and equivalents of what is disclosed, so that the "means" does not necessarily cover all possible ways to perform the function.

It is important to keep in mind that the law directs that a means-plus-function element is to be construed as covering the structure or material that has been disclosed in the application for performing the function, plus equivalents of such structure or material. If a patent does not disclose *any* structure or material for performing the function, there is a risk that the claim might be held to be indefinite. Electrical cases, particularly those involving computers, frequently have drawings with boxes that are joined by lines to other boxes. There might be a "control unit" box, for example, which orchestrates the operation of other units in a manner described in great detail in the patent. It seems likely that a court would interpret "means for controlling" the other units so as to make them perform stated functions as covering a suitably programmed computer if the necessary programming would be routine. But why take chances? It is better practice, when patent applications are drafted, to expressly state that a computer could be used, or to otherwise identify a suitable physical structure or material that could be employed. This would reduce the risk that some future patent infringer might argue that nothing but an empty box is disclosed for performing the recited function, and that the equivalent of nothing is also nothing. It goes without saying, of course, that, in addition to fulfilling the requirements of the sixth paragraph of 35 USC 112 if means-plus-function claiming is employed, the patent must also disclose how to make and use the invention as-claimed in sufficient detail to enable a person who is ordinarily skilled in the art to make and use the invention without undue experimentation.

Might the limitation imposed by the last paragraph of 35 USC 112 be avoided by the simple expedient of reciting something like a "circuit for" performing a specified function, instead of "means for" performing the function? That is, are the words "means for" a necessary and sufficient condition for triggering the last paragraph of 35 USC 112? The answer here is not clear-cut, at least at the present (2003) state of the law. However, recent decisions by the Court of Appeals for the Federal Circuit suggest that an element in a claim that is defined entirely by the function it performs should be interpreted under the last paragraph of 35 USC 112, even if the words "means for" are not present. Section 2181 of the MPEP can be consulted for further information on this topic.

Examples of suitable means-plus-function clauses are "means for cooling the transistor" (where "cooling the transistor" is the function) and "means for rotating the first wheel in a predetermined direction and for rotating the second wheel in a direction opposite the predetermined direction." The function in the latter example might best be characterized as a "compound function." "Means, disposed adjacent the pulley, for limiting the rotary speed of the shaft" would be a proper construction, as would its equivalent "means for limiting the rotary speed of the shaft, the means being disposed adjacent the pulley." A means-plus-function clause can include explicitly recited structure, such as "means for attaching the hanger to the wall, the means including a bolt affixed to the hanger." Similarly, a means-plus-function clause can include another means-plus-function clause, as in "means for attaching the hanger to the wall, the means for attaching including means for shielding the hanger from rain."

If a specific physical structure is recited as an element of a claim (that is, the element is not identified entirely or almost entirely by the function it performs), the function of the structure

can be stated in order to further define the nature or properties of the structure, or to verbally link it to other elements recited in the claim. The more specifically the structure is recited, the smaller the risk that a court might conclude that the recitation effectively preempts all possible ways of performing the function, and thus represents a means-plus-function clause in disguise. Examples of claim language that couples a physical structure with its function include "a bolt for mounting the hanger on the wall" or the equivalent recitation "a bolt to mount the hanger on the wall." Not infrequently, the function may be further specified using additional phrases, such as "so that," "in order to," "thereby," or "whereby." For example "a bolt to mount the hanger on the wall, so that the hanger moves in unison with the wall" or "a bolt for mounting the hanger to the wall, whereby the hanger moves in unison with the wall."

An example using even more of these techniques for introducing functional language would be "a voltage regulator, responsive to a signal from the temperature sensor, for reducing the power supplied by the power source to the amplifier if the temperature exceeds a predetermined value, in order to protect the amplifier from overheating so that the amplifier remains operative despite a malfunction in the input circuit." In this latter example, the functional statements help to further describe the physical structure that is recited (that is, the voltage regulator), but only to a limited degree, and are present primarily to verbally link the physical structure to other elements of the claim (the sensor, the amplifier, and the input circuit). The claim language in this example also tends to tout the advantage achieved by the invention (which is not necessary in a claim, but perhaps the drafter of this particular claim hopes that it will have a constructive psychological impact on the examiner).

Section 7 – Names and Numbers of Elements

When physical structure is recited as an element of a claim, it should be called the same thing that it was called in the specification. For example, if something is called a "rod" in the specification, it would be improper to shift terminology and call it a "shaft" in the claims. Frequently, concrete terms are used in the specification to describe the preferred embodiment, and it would be desirable to use broader terms in the claims. An acceptable way to do this is to mention the broader term in the specification and then identify it with the narrower term that is actually used to describe the preferred embodiment of the invention. For example, if a rivet is used in the preferred embodiment, but a bolt could be used instead, the specification might refer to "a fastener, such as rivet 100..." and this would support the use of the more general term "fastener" in the broadest claims.

Although the terminology used for structure in the claims should match the terminology employed in the specification, the word "means" does not need to appear in the specification in order to support means-plus-function claiming. The specification should be quite clear, though, about what components of the preferred embodiment perform the functions recited in the "means" clauses.

Suppose that a claim recites elements A and B and then "an elongated member that is attached to element A, element B being connected to the elongated member at a predetermined distance from element A." If this is the only "member" in the claims, it can be referred to later as simply "the member." The word "elongated" is then simply an adjective describing a characteristic of the "member," and not part of the name of the element itself. But if element B is a "bracket member," confusion would result if the claim later referred to "the member" without specifying which of the members (the elongated member or the bracket member) was intended. In such a case, it is appropriate to treat "elongated" and "bracket" as part of the name of the respective member, and refer to it that way every time it is mentioned in the claims. If there are two "elongated members" in the claims, one connecting elements A and B and the other connecting elements D and E, it is proper to refer to them in subsequent recitations as "the elongated member connecting elements A and B" or "the elongated member connecting elements C and D." This could rapidly become cumbersome if more "elongated members" are recited as elements, though, so it would probably be better to recite them as "an elongated first member" and "an elongated second member." "First member" and "second member" would then be the names of the elements, and this would permit the elements to be referred to in a simple manner later in the claims.

The "predetermined" distance between elements A and B that was mentioned above simply means that the distance is determined beforehand. One would generally use this construction to provide an antecedent basis for "*the distance* between elements A and B" later in the claim. The word "predetermined" is present in this example primarily for stylistic reasons, since an antecedent basis is needed for the subsequent mention of "*the distance* between elements A and B," and attempting to provide the necessary antecedent basis by reciting that element B is located "a distance" from element A sounds somewhat odd in the English language. Simply put, saying that element A is located "a predetermined distance" from element B sounds better in English than saying that element A is located "a distance" from element B. If the claims only need to specify that elements A and B are not located together, and do not later refer to "the distance between elements A and B," one could consider reciting that element B is mounted at "a position spaced apart" from element A.

Suppose that claim 1 recites "an elongated member," and that claim 2 depends from claim 1 and introduces another "elongated member." If this second elongated member is never to be referred to again in the claims, claim 2 can simply recite "another elongated member" or "an additional elongated member," or so forth. If one or both of the "elongated members" are to be referred to in subsequent claims, claim 2 can recite, "wherein said elongated member [meaning the one already recited in claim 1] is a first elongated member, and further comprising a second elongated member...".

A claim that recites "means for mounting element A on element B," for example, can later refer to "the means" if no other "means" clauses are present. If other "means" clauses are present, the "means for mounting element A on element B" can be referred to later as "the means for mounting." It is also possible to name "means" clauses, as in "connector means for mounting element A on element B" or "first means for mounting element A on element B," and these named means can later be referred to as "the connector means" or "the first means."

It is sometimes desirable for a claim to specify that more than one of some particular element must be present. For example, a claim directed to a keyboard might recite "a plurality of keys movably mounted on the base." However, it would be proper to simply use the plural form, as in "keys that are movably mounted on the base."

At one time, the word "or" in an American claim was considered the earmark of an improper "alternative recitation" that was deemed to be inherently indefinite. This ground of rejection has faded, thankfully, and most American examiners today will accept claim limitations such as "one or more keys movably mounted on the base." In the past, though, it was generally necessary to express the concept as "at least one key movably mounted on the base" in order to avoid the word "or," and this "at least one" strategy is still commonly used today.

Employing either "at least one" or "one or more" in a claim frequently necessitates cumbersome language later on. Suppose, for example, that the innovation in the keyboard is that each key operates not one switch but two, so that the keyboard continues to work even if some of the switches fail. If the claim recites "one or more keys," then it is also necessary for it to recite something like "one or more pairs of switches, each of the one or more pairs of switches being positioned for actuation by a respective one of the one or more keys." The "at least one" construction can be similarly difficult to deal with, and the same can also be said about "a plurality of," although perhaps to a somewhat lesser degree.

Very frequently, it is possible to avoid such difficulties by reciting elements in the singular. A claim that recites "a key" is considered to read on a keyboard having a number of keys, since "a key" is present even if additional keys are also present. It usually makes little difference from the standpoint of patentability over the prior art whether a claim specifies one element, or at least one element, or a plurality of elements. For example, if a patent examiner were to locate prior art showing a pair of switches that are actuated by depressing some movable member in a keyboard-type environment, it is unlikely that he could be persuaded that employing the same idea repeatedly, using a number of keys and switch pairs, would be non-obvious. In short, it is fairly unusual for it to be necessary for a claim to recite more than one of any particular element in order to distinguish an invention from prior art, and doing so frequently creates claim-drafting problems that could otherwise be avoided.

If one would still like to have claims to a keyboard (for example) that recite more than one

key, one way to simplify the verbal difficulties is to introduce the keys in different claims. For example, claim 1 could recite one key and one pair of switches. Dependent claim 2 could then recite "another key" and "another pair of switches" that cooperate with the "another key." Claim 3, depending from claim 2, could then recite "at least one further key" and "at least one further pair of switches, each at least one further pair of switches corresponding to a respective further key, and being positioned for actuation by the corresponding further key." The claim language has become convoluted by claim 3, but claims 1 and 2 are fairly easy for juries, judges, and competitors to understand.

Although it is usually proper for a claim to recite only one of some particular element instead of a plurality of them, one must be careful not to recite an element a plurality of times if it appears only once in the actual device. Reciting an element twice when it is present only once is called "double inclusion of elements." Consider, for example, the multiplier shown in Figure 6 (this drawing is taken from the author's patent 6,012,078):

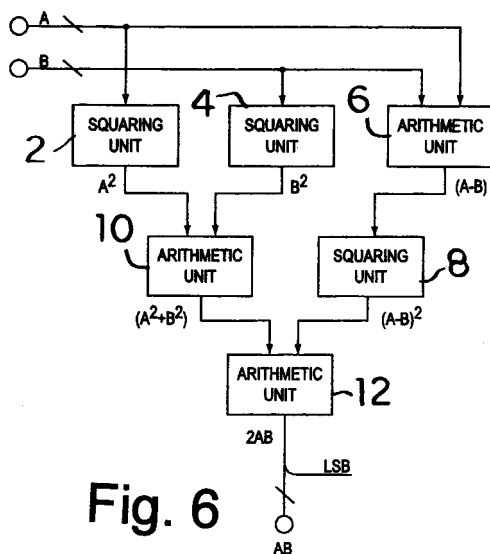


Fig. 6

The multiplier relies on the algebraic identity $(A - B)^2 = A^2 - 2AB + B^2$. It includes a squaring unit 2 that receives a binary number A and a squaring unit 4 that receives a binary number B. These squaring units may be look-up memories that store a table of squares. The numbers A and B are also supplied to an arithmetic unit 6, such as a subtractor that finds the difference $A - B$ between the numbers. The difference is supplied to a squaring unit 8, which finds $(A - B)^2$. The outputs A^2 and B^2 of the squaring units 2 and 4 are supplied to an arithmetic unit 10, such as an adder that finds the sum $(A^2 + B^2)$. Finally, the multiplier includes an arithmetic unit 12, such as a subtractor that finds $A^2 + B^2 - (A - B)^2$, or $2AB$. This quantity can be divided by 2, to yield the product AB, by the simple expedient of dropping the least significant bit.

Claim 1 to the multiplier might read:

1. A multiplier, comprising:
 - first means for squaring a first number;
 - second means for squaring a second number; and
 - third means, connected to the first and second means, for finding the product of the first and second numbers.

Now, onward to claim 2. How about “2. The multiplier of claim 1, further comprising an arithmetic unit that receives the first and second numbers and outputs their difference”? No. The reason is that the “arithmetic unit” of claim 2, which reads on the arithmetic unit 6 in Figure 6, is part of the “third means” recited in claim 1. Claim 2 would then define a multiplier with an extra arithmetic unit 6. To avoid such double-inclusion of the arithmetic unit 6, claim 2 should be “2. The multiplier of claim 1, wherein the third means comprises an arithmetic unit that receives the first and second numbers and outputs their difference.”

The above description of the multiplier shown in Figure 6, incidentally, employs a technique that was described earlier in this section. The “arithmetic units” 6, 10, and 12 could have been named “subtractor 6,” “adder 10,” and “subtractor 12.” However, the same basic circuit can be used to find AB using the algebraic identity $(A + B)^2 = A^2 + 2AB + B^2$, in which case arithmetic unit 6 would be an adder instead of a subtractor. By naming the component 6 an “arithmetic unit,” we are permitted to have the following claim 3: “The multiplier of claim 1, wherein the third means comprises an arithmetic unit that receives the first and second numbers and finds their sum.”

Some patent practitioners in the U.S. avoid pronouns (such as “an arithmetic unit that receives the first and second numbers and finds *their* sum” in the above example) in claims. Others feel that pronouns are useful if they simplify the claim language and if it is quite clear what is meant. If an examiner does object to the use of a pronoun in a claim, it is easy enough to amend the claim by replacing the pronoun by what was intended (as in “an arithmetic unit that receives the first and second numbers and finds the sum of the first and second numbers.”).

Section 8 – Special Problems

At one time, the USPTO considered a number of words or expressions to be inherently indefinite when used in patent claims. Since the patent laws require claims "particularly pointing out and distinctly claiming the subject matter" of the invention, these words or expressions would lead to almost-automatic rejections for indefiniteness. In recent years, though, the courts of this country have made it clear that the real test for "particularly pointing out and distinctly claiming" an invention is whether the claims would be understandable to an ordinarily skilled person who had read the application, so that this person would have a sound idea of what was covered by the claims. As a result, the USPTO has relaxed its position on some terms or expressions that it previously considered to be objectionable.

A prime example concerns the word "or." As was mentioned in the last section of this booklet, a claim reciting "an element C connected to the element A *or* the element B" was considered to be indefinite. The rationale was that the so-called "alternative recitation" made it unclear whether the claim protected a device in which the element C was connected to the element A, or a device in which the element C was connected to the element B. The present edition of the MPEP, though, does not explicitly criticize such claim language. But neither does the present edition of the MPEP explicitly accept alternative recitations without qualification. It is therefore better practice to avoid the word "or." Several accepted techniques for doing this were developed in the past. One was to recite "at least one of element A and element B," which is equivalent to "or" but avoids the troublesome word itself. Another expression, developed mainly in chemical patent practice but also acceptable in electrical and mechanical cases, is "an element selected from the group consisting of element A and element B."

One important consequence of alternative recitations may not be immediately apparent. If one of the alternatives recited in a claim is present in the prior art, for purposes of patentability over the prior art it does not matter whether the other alternatives are present in the prior art or suggested by the prior art. Consider again a claim reciting "an element C connected to the element A or the element B." A prior art reference disclosing a device having an element C that is connected to an element A would meet this claim language, even if connecting an element C to an element B would not be obvious. For this reason, if alternatives are recited in an independent claim, it is a good idea to include dependent claims that recited the alternatives one by one. For example, one dependant claim might recite "wherein the element C is connected to the element A" and another dependent claim might recite "wherein the element C is connected to the element B."

So-called "negative limitations" were considered to be objectionable at one time, based on the theory that a claim should specify what is present in an invention rather than what is not present. An example of a negative limitation is "a wall" and "a hole in the wall." Here, "a wall" is recited as one element and "a hole," meaning a localized absence of wall material so as to provide an aperture, is recited as another element. The way to avoid this is to recite the wall as an element and a hole as a feature of the wall, as in "a wall having a hole." However, American patent examiners now accept negative limitations if they are understandable.

Words such as "about," "substantially," and "approximately" are frequently used in claims in order to permit to a degree of variation when numbers or mathematical relationships are recited. For example, "wherein element A is approximately three times as wide as element B" or "wherein element A extends in a direction substantially perpendicular to element B." Such words

are acceptable if the disclosure provides sufficient guidelines about what variations would be workable in the invention, so that an ordinarily skilled person would know what was meant. These guidelines need not be explicitly set forth in the disclosure (although this certainly wouldn't hurt).

Relative terms such as "long," "heavy," narrow," or "thick" are a frequent source of trouble in claims. There are two reasons for this. One reason is that a patent examiner might consider a claim that recites a "thick" oxide layer in an integrated circuit to be indefinite on the ground that it is unclear just how deep the layer needs to be in order to be considered "thick." Another reason is that a patent examiner is entitled to interpret the language of a claim broadly when he considers whether the claim is patentable over the prior art. Because of this, an examiner would probably be justified in characterizing virtually any oxide layer in a prior art reference, except possibly for a very thin one, as a "thick" oxide layer.

These problems do not mean that relative terms should be avoided in claims. They are, in fact, very useful. However, they should be used with other claim language that provides a way to determine how thick (or long, or heavy, or narrow, or so forth) the element needs to be in order to come within the language of the claim. Frequently the best way to do this is by comparing the characteristic in question to another element that is recited in the claim. For example, "an oxide layer on the metal layer, the oxide layer having a thickness that is greater than the thickness of the metal layer."

"Wherein" is a versatile word that is frequently used in claims. It may be employed to start a new paragraph that recites limitations which would be inconvenient to locate elsewhere in the claim. For example "wherein the gear has a side with a cam and the switch is actuated by the cam as the gear rotates" (instead of "a rotatably mounted gear having a side with a cam" and "a switch disposed adjacent the side of the gear, the switch being actuated by the cam as the gear rotates"). The word "wherein" may also be used during prosecution of an application when limitations from one claim are transferred to another claim. For example, if a patent examiner rejects claim 1 as being unpatentable over the prior art but only "objects" to claim 2 on the ground that it depends from a rejected claim, it is common practice (if the applicant does not want to argue against the rejection of claim 1) to cancel claim 2 and insert its limitations into claim 1 as a "wherein" paragraph. The word "wherein" may also be employed within a paragraph of a claim, in some situations, in order to permit a different verb form to be used. For example, "a switch disposed adjacent the side of the gear, *wherein* the switch *is activated* by the cam as the gear rotates" instead of "a switch disposed adjacent the side of the gear, the switch *being activated* by the cam ...".

A "whereby" paragraph may be added to a claim in order to specify the consequences of what has already been recited. Such a paragraph should be looked upon as sort of a summary, and should not be used to introduce new limitations that are needed for patentability over the prior art. Another way of saying this is that the claim must be patentable over the prior art even without the "whereby" paragraph. Most American practitioners do not use "whereby" paragraphs very often.

Section 9 – Other Claim Formats

In the format that is used most frequently for independent claims in the United States, the preamble tends to be fairly brief and is followed by the transition "comprising:" or "which comprises:", and the transition is followed by the elements making up the invention specified in the preamble. This might be called the standard American format for independent claims, and is the format that has been used in the earlier sections of this booklet. There is another format that can be used, though. Since this alternate format first appeared in an application by an inventor named Jepson, an independent claim in the alternate format is called a "Jepson-type" claim.

A typical Jepson-type claim has a preamble such as "An improved [name of the device, such as 'bicycle'] of the type that includes [elements present in prior art devices of this type, such as 'a frame, a wheel rotatably mounted on the frame, a pedal assembly that is rotatably mounted on the frame and that is peddled by a rider of the bicycle, and means for transferring energy from the pedal assembly to the wheel']." The preamble is followed by "wherein the improvement comprises:" as a transition. The body of the claim then specifies what is new. This can be one or more new elements (such as "a generator driven by the means for transferring energy, and a siren powered by the generator") or something new about one or more of the old elements (such as "wherein the wheel comprises a rubber tire inflated with carbon dioxide gas").

When a Jepson-type claim is interpreted, the old elements that are set forth in the preamble are considered to be part of the invention that is being claimed, just as though they had been included in the body of a standard claim.

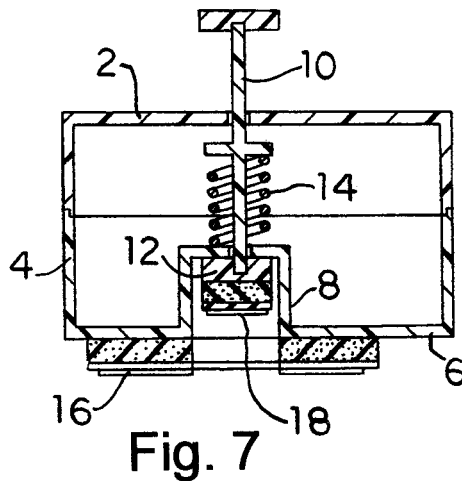
One advantage of a Jepson-type claim is that American patent examiners tend to be fairly lenient about the degree to which elements recited in the preamble need to be verbally linked to one another. It is likely that a patent examiner would accept something as simple as "An improved bicycle of the type having a wheel, a pedal assembly, a frame on which the wheel and pedal assembly are mounted, and means for transferring energy from the pedal assembly to the wheel, wherein the improvement comprises...". This leniency about verbal linkages between elements in the preamble makes the Jepson-type format a useful one in situations where it is not desirable, for one reason or another, to be very specific in the claim about relationships between elements. Such a situation may occur when a patent practitioner is not very familiar with the technology involved in a particular invention and consequently does not want to risk an inaccurate or too-limiting statement of the relationships.

One disadvantage of a Jepson-type claim is that everything in the preamble is admitted to be prior art. This makes it necessary to be cautious. A practitioner can run into trouble with a Jepson-type claim by placing features disclosed in two different prior art references in the preamble, since this constitutes an admission that all of the features are prior art and relieves the patent examiner of the responsibility to explain why an ordinarily skilled person would have been motivated to combine these prior art features. Instead, in order to support an obviousness rejection, the examiner would only need to locate a prior art reference that discloses or suggests what is specified in the body of the claim, and explain why an ordinarily skilled person would have been motivated to modify the prior art recited in the preamble accordingly. This may be a simpler task, for the examiner, than explaining why an ordinarily skilled person would have been motivated to modify a first reference in accordance with a second reference in order to obtain what is recited in the preamble, and then modify this modification in accordance with a third reference in order to achieve what is recited as the improvement.

A claim format that can be used in some European countries has a preamble that specifies what is old, followed by "characterized in that" as a transitional phrase. Some patent examiners in the United States accept this format, apparently considering it to be simply a variation of the Jepson-type format. It seems likely that the courts would be inclined to agree. However, the author is not aware of any authoritative court decisions that have thoroughly examined the ramifications of this format under the patent laws of the United States, so it would be prudent to be cautious.

The claims that have been discussed up to now have been apparatus claims, directed to physical structure. Claims can also be directed to activities. Such claims are called method claims or process claims (the terms are synonymous). The elements of a method claim are method steps. The fact that this booklet contains only a few paragraphs about method claims should not be taken to mean that they are unimportant in American patent practice. They are, in fact, used quite frequently by skillful practitioners. But since the same fundamental considerations that have been discussed in the context of apparatus claims -- clear and definite claim language without ambiguities, antecedent basis, claim terminology that conforms to the terminology used in the specification, avoiding double recitation of elements, and so forth-- also apply for method claims, there is no need to discuss these topics again for method claims.

Method claims are naturally adapted for use when an invention is directed to a process for manufacturing something or to a new use for an old device or apparatus. They can also be used to claim the process that is performed by an apparatus. For example, consider the rubber stamp shown in Figure 7 (which is taken from the author's patent 5,471,930):



The rubber stamp has a hollow plastic holder that includes an upper portion 2 and a lower portion 4. The lower portion 4 has a base 6. It also has a well 8 that rises from the base 6. A plunger 10 extends through a hole in the upper portion 2 and another hole at the top of the well 8. A disk-shaped plastic member 12 is located inside the well 8 and is connected to the bottom end of the plunger 10. A spring 13 urges the plunger 10 upward. The rubber stamp itself (that is, the resilient, image-carrying part) is divided into two portions that provide different parts of a single design. A first portion 16 is mounted on the base 6, and a second portion 18 is mounted on the member 12. The user of the stamp can ink the first portion 16 by pressing it against a first stamp pad (not shown) that is saturated with ink having a first color. The user can ink the second portion 18 by depressing the plunger 10 and pressing the second portion 18 against a second stamp pad (not shown) that is saturated with ink having a second color. The user can then press the first portion 16 against a piece of paper (not shown) and depress the plunger to also press the

second portion 18 against the piece of paper, thereby transferring a multi-colored design to the piece of paper.

A claim directed to the method of using the stamp of Figure 7 might go as follows:

A method for using a rubber stamp having a holder, a first stamp portion which is fixedly mounted on the holder, and a second stamp portion which movably mounted on the holder, said method comprising the steps of:

pressing the holder toward a first stamp pad to ink the first stamp portion while the second stamp portion is in a raised position with respect to the first stamp portion;

moving the second stamp portion to a lowered position with respect to the first stamp portion;

pressing the holder toward a second stamp pad to ink the second stamp portion while the second stamp portion is in its lowered position; and

pressing the holder toward a piece of paper and moving the second stamp portion to an intermediate position between its raised and lowered positions to print on the piece of paper a composite image formed by the first stamp portion and the second stamp portion.

After a step has been recited in a method claim, it can thereafter be referred to as “the step of...”. For example, if a claim has recited “heating the workpiece to a temperature of at least 300°C in an inert atmosphere,” this can later be called (in the same claim or a dependent claim) “the step of heating the workpiece.” It is unnecessary to repeat the entire step (as in “the step of heating the workpiece to a temperature of at least 300°C in an inert atmosphere,” or even “the step of heating the workpiece to a temperature of at least 300°C”) unless more than one heating step has been recited and it is necessary to distinguish between them. This might occur if, for example, the claim recites “quenching the workpiece” after it has been heated to at least 300°C in an inert atmosphere, followed by “heating the workpiece to a temperature of at least 150° for ten minutes in an atmosphere rich in oxygen.” Referring later to simply “the step of heating” would be ambiguous here, since it would be unclear which of the heating steps was meant. Instead, it would be appropriate to refer to either “the step of heating the workpiece to a temperature of at least 300°C” or “the step of heating the workpiece to a temperature of at least 150°C.” Perhaps a better alternative, since it would produce an antecedent basis with less verbiage, would be to recite “heating the workpiece a first time, to a temperature of at least 300°C in an inert atmosphere; quenching the workpiece; and heating the workpiece a second time, to a temperature of at least 150° for ten minutes in an atmosphere rich in oxygen.” This construction would provide an antecedent basis for referring later to “the step of heating the workpiece a first time” or “the step of heating the workpiece a second time.”

It is permissible in method claims to identify the steps by letter, and then later to refer to a step by its letter. For example:

A method for electrically insulating an aluminum workpiece, comprising:

- (a) heating the workpiece to a temperature of at least 300°C in an inert atmosphere;
- (b) quenching the substrate; and
- (c) heating the workpiece to a temperature of at least 150° for ten minutes in an atmosphere rich in oxygen.

Dependent claims can then refer to “step (a)” or so forth. This technique of identifying steps by letter is particularly useful when steps are repeated. For example:

A method for electrically insulating an aluminum workpiece, comprising:

- (a) heating the workpiece to a temperature of at least 300°C in an inert atmosphere;
- (b) quenching the substrate;
- (c) heating the workpiece to a temperature of at least 150° for ten minutes in an atmosphere rich in oxygen;
- (d) measuring the thickness of an oxide layer formed on the workpiece while the workpiece was heated in an atmosphere rich in oxygen; and
- (e) repeating steps (a) through (d) until the oxide layer is about one millimeter thick.

Dependent method claims may either add steps, as in “further comprising inspecting the oxide layer for cracks,” or further define a step that has already been recited, as in “wherein the step of quenching the substrate comprises dipping the substrate in water, followed by blowing air against the substrate to dry the substrate.” It is also permissible for a dependent claim to tell how a step is conducted, as in “wherein the step of quenching the substrate is conducted for at least two minutes.” Most American examiners would also accept a dependent claim that limits the workpiece, such as “wherein the workpiece is a cylindrical rod at least ten centimeters long,” but other examiners might take the position that this is an improper dependent claim since it specifies nothing further about the method itself.

The last class of claims to be examined in this booklet are called “product-by-process” claims. They claim a product, or article, in terms of the process by which it is made. For example, “An aluminum workpiece with an oxide layer formed by the method of claim 1.” It is important to remember that a produce-by-process claim is an apparatus claim, not a method claim, and patentability over the prior art depends upon the product itself and not the method used to make it. If the aluminum workpiece with an oxide layer made by the method is indistinguishable from a prior art aluminum workpiece with an oxide layer that was made using a different method, the product-by-process claim would be anticipated by the prior art workpiece. On the other hand, if the process inherently produces any difference from the prior art workpiece, perhaps bands of different density in the oxide layer due to the quenching step, and if this difference would not have been obvious from the prior art, then the product-by-process claim is patentable.