NOLO

"Thoroughly explains the patent process... and has all the forms and instructions needed to patent a product."
WASHINGTON POST

With Downloadable FORMS

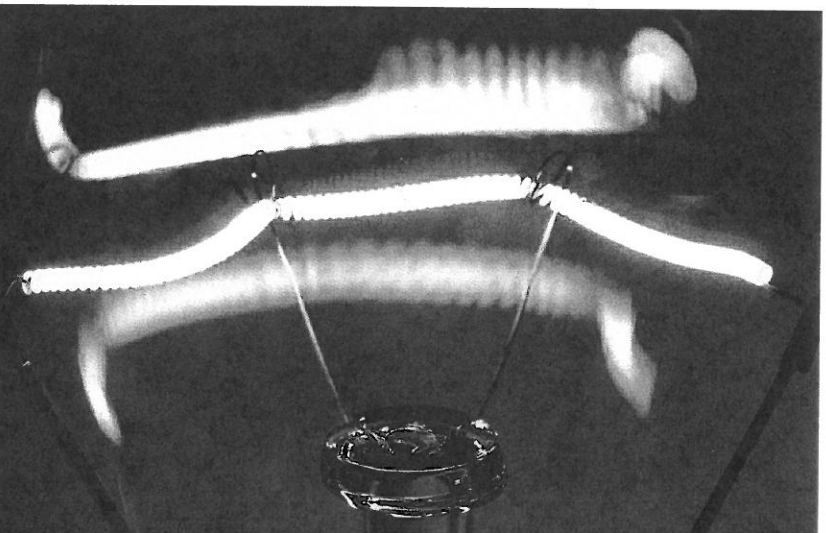
18TH EDITION

Patent It Yourself

- Perform your own patent search
- Understand the latest patent laws
- Prepare and file your patent application

Your Step-by-Step Guide to Filing at the U.S. Patent Office

"For any entrepreneur who's inventing something, it's the one book you should read."
NICK WOODMAN,
FOUNDER & CEO OF GOPRO



THE WORLD'S BESTSELLING PATENT BOOK

PATENT ATTORNEYS DAVID PRESSMAN
& THOMAS J. TUYTSCHAEVERS

Free Legal Updates at Nolo.com

CHAPTER

2

The Science and Magic of Inventing

Inventor's Commandment 2

To invent successfully, be aware of problems you encounter and seek solutions. Also, take the time to study and investigate the practicality of new phenomena whether they occur by accident or flash of insight. Persevere with any development you believe has commercial potential.

Before we get to patents, the primary subject of this book, we provide this chapter to discuss inventions and inventing. Why do this? To begin, you may be a first-time inventor and thus have no experience in the real world of protecting and patenting inventions. We believe that you'll be a better inventor if you understand and become familiar with some successful inventors and the invention process. Also, we believe that too many first-timers get discouraged before they try enough. To inspire you to hang in there, we include here some past success stories. Hopefully, when you see that many other small, independent inventors have found their pot of gold, you'll be stimulated to press on.

Inventing can not only be profitable, but it provides things that enhance our lives, making them more interesting, pleasurable, exciting, rewarding, and educational. As the noted Swiss psychologist, Piaget, once said, "We learn most when we have to invent." Remember that everything of significance, even the chair you're probably seated in now, started with an idea in someone's brain. If you come up with something, don't dismiss it; it could turn out to be something great!

Common Misconception: The day of the small inventor is over; an independent inventor no longer has any chance to make a killing with his or her invention.

Fact: As you'll see by the examples given later in this chapter, many small, independent inventors have done extremely well with their inventions. Billions of dollars in royalties and other compensation are paid each year to independent inventors for their creations. In fact 73% of all inventions that have started new industries have come from individual inventors. So, don't be a victim of the "no-use-going-on-with-it-because-surely-someone-has-invented-it-already" syndrome. While we recommend that you don't rush blindly ahead to patent your work without making a sensible investigation of prior inventions and your creation's commercial potential (in the ways we discuss later), we urge you not to quit without giving your invention a fair chance.

Another reason for this chapter is that many inventors come up with valuable inventions, but they haven't developed them sufficiently so that they can be readily sold. If their creations could be improved with further work, they'd have a far greater chance of success. So here we'll also give some hints about such things as improving your inventions, solving problems about workability, and drawbacks.

If you've already made an invention, or are even in the business of inventing, we believe the techniques in this chapter that increase your creativity and provide additional stimulation will help you to make more and better inventions. On the other hand, we also recognize that the information in this chapter may not be particularly helpful to the experienced inventor or the corporate inventor—after all, you're already firmly in the inventing business. If you would rather skip this information for now, go to Chapter 3, where our discussion of record keeping should prove of value to even the most seasoned of inventors.

A. What We Mean by "Invention"

In its most general sense, an invention is a solution to a problem. For the purpose of this book, an invention is any thing, process, or idea that isn't generally and currently known; which, without too much skill or ingenuity, can exist in or be reduced to tangible form or used in a tangible thing; which has some use or value to society; and which you or someone else has thought up or discovered.

Note that under this definition, an invention can be a process or even an idea, so long as it can be made tangible in some way, "without too much skill or ingenuity." On the other hand, the definition eliminates fantasies and wishes, such as time-travel or

perpetual motion machines, since these obviously (at least to us) can't be made tangible.

An invention must have some use or value to society; otherwise what good is it, and how will you sell it? It must be generally unknown anywhere in the world (at the time you invent it), and it must have been thought up or discovered by you or someone else—otherwise it doesn't really have inventive value.

While you may think that an invention must be a major development to be successful, the truth is that most successful inventions are evolutionary rather than revolutionary. For example, the basic concept of the transistor was invented in the 1930s, but was not feasible enough to be successful until Drs. Brittain, Bardeen, and Shockley made some evolutionary but successful improvements in the late 1940s.

Why do we bother to define the term invention in such detail? So you'll begin to understand it and have a better feel for it, as well as to define the limits of its usage in this book. As you'll see, our primary concern is with inventions that qualify for a patent (that is, patentable inventions). However, nonpatentable inventions can also be valuable as long as society finds them at least somewhat special and useful.

B. Inventing by Problem Recognition and Solution

Now that you know what an invention is, how do you make one? Most inventions are conceived by the following two-step procedure: (1) recognizing a problem, and (2) fashioning a solution.

Although it may seem like duck soup, recognizing a problem often amounts to about 90% of the act of conceiving the invention. As one wise person said, "To be an inventor is to perceive need." In these situations, once the problem is recognized, conceiving the solution is easy. Consider some of the Salton products—the home peanut butter maker, for instance, or the plug-in ice cream maker for use in the freezer. In both cases, once the problem was defined (the need for an easy homemade version of a product normally purchased at the store) implementing the solution merely involved electrification and/or size reduction of an existing appliance. Once the problem was defined, any competent appliance designer could accomplish its solution. True, during the implementation of the idea, that is, the design of the actual hardware, designers and engineers often contribute the very aspects of the invention that make it ingenious and patentable. Still, the main ingredient leading to a successful outcome for most inventions consists of recognizing and defining the problem that needs to be solved. Although Edison seemed to contradict this when he said that inventing is 10% inspiration and 90% perspiration, he was referring to the whole experience of inventing, including conception, making a practicable model, and licensing or selling the invention. Here, we're referring just to the conception part of inventing—what Edison called "inspiration."

Of course, in some contexts, the recognition of a problem plays no part in the invention. Most improvement inventions fall into this category, such as, for example, the improvement of the mechanism of a ballpoint pen to make it cheaper, more reliable, stronger, etc. But in general, you will find it most effective to go about inventing via the two-step process of identifying a problem and solving it. Or, as famed inventor Jacob Rabinow said, "You invent because something bothers you."

Let's look at some simple inventions that were made using this two-step process and which have been commercially implemented. We delineate the problem ℙ and solution $ in each instance. Where we know an Independent Inventor was responsible, we add an Ⅱ.

1. **Grasscrete.** ℙ Wide expanses of concrete or asphalt in a parking lot or driveway are ugly. $ Make many cross-shaped holes in the paving and plant grass in the earth below so that the grass grows to the surface and makes the lot or driveway appear mostly green; grass is protected from the car's tires because of its subsurface position.
2. **Intermittent Windshield Wipers.** ℙ In drizzles, the slowest speed of windshield wipers was unnecessarily fast, and merely slowing the wipers was unsatisfactory, since a slow sweep was annoying. $ Provide a "drizzle" setting where the windshield wipers made normally fast sweeps but

paused after each sweep. (Dr. Robert Kearns, Ⅱ. Dr. Kearns's brilliantly ingenious solution earned him and his estate over $50 million in royalties, after he sued Ford, Chrysler, and others, as dramatized in the movie, *Flash of Genius*.)

3. **Buried Plastic Cable-Locator Strip.** ℙ Construction excavators often damage buried cables (or pipes) because surface warning signs often are removed or can't be placed over the entire buried cable. $ Bury a brightly colored plastic strip parallel to and above the cable; it serves as a warning to excavators that a cable is buried below the spot where they're digging. (This is a "new-use" invention since the plastic strip per se was obviously already in existence.)
4. **Magnetic Safety Lock for Police Pistols.** ℙ Police pistols are often fired by unauthorized persons. $ A special safety lock inside the pistol releases only when the pistol is held by someone wearing a finger ring containing a high-coercive-force samarium-cobalt magnet.
5. **Wiz-z-er™ Gyroscopic Top.** ℙ Gyroscopes are difficult to get running: they require the user to wind a string around a shaft surrounded by gimbals and then pull it steadily but forcefully to set the rotor in motion. $ Provide an enclosed gyro in the shape of a top with an extending friction tip that can be easily spun at high speed by moving it across any surface. (Paul Brown, Ⅱ. Mr. Brown came up with this great invention because, while at a party, he had repeated difficulty operating a friend's son's gyro. His first royalty check from Mattel was five times his annual salary!)
6. **Dolby® Audio Tape Hiss Elimination.** ℙ Audio tapes played at low volume levels usually have an audible hiss. $ Frequency-selective companding of the audio during recording and expanding of the audio during playback to eliminate hiss. (Ray Dolby, one of the most successful Ⅱs of modern times.)
7. **Xerography.** ℙ Copying documents required messy, slow, complicated photographic apparatus. $ Xerography—the charging of a photosensitive surface in a pattern employing light reflected from the document to be copied and then using this charged surface to pick up and deposit black powder onto a blank sheet. (Chester Carlson, Ⅱ. When Mr. Carlson, a patent attorney, brought his invention to Kodak, they said it could never be commercially implemented and rejected it. Undaunted, he brought it to The Haloid Co., which accepted it and changed its name to Xerox Corporation; the rest is history.)
8. **Flip-Top Can.** ℙ Cans of beverage were difficult to open, requiring a church key or can opener. $ Provide the familiar flip-top can. (Ermal Frase, Ⅱ.)
9. **FM, CW, and AGC.** ℙ Information wasn't conveyable by radio due to noisy, limited frequency response and fade-out of AM reception. $ Provide CW, FM, and AGC circuitry, familiar to all electronic engineers. (Edwin Howard Armstrong, Ⅱ, the genius of high fidelity.)
10. **Thermostatic Shower Head.** ℙ Shower takers sometimes get burned because they inadvertently turn on the hot water while standing under the shower. $ Provide a thermostatic cut-off valve in the supply pipe. (Alfred M. Moen, Ⅱ.)
11. **VCR Plus.** ℙ In the days before on-demand movies, most people were too lazy or too put off by technical matters to learn how to enter a date, time, and channel into their VCR. $ With VCR Plus, each program was assigned a special code number in the newspaper TV listings and the VCR owner needed merely enter the number and transmit it to the VCR.
12. **Organic Production of Acetone.** ℙ During WWI, the U.K. desperately needed acetone to make explosives, since its normal source was cut off. $ Use an anaerobic bacterium to produce acetone from locally available corn mash. (Dr. Chaim Weizmann, II. This invention helped save one nation and start a new one: It was instrumental in helping the U.K. and the Allies survive WWI and defeat the Germans. The U.K. rewarded Weizmann with the Balfour Declaration, which helped lead to the eventual formation of the State of Israel.)

13. **Grocery Shopping Cart.** ℙ Shoppers in grocery stores used their own small, hand-carried wicker baskets and bought only the small amounts that they could carry in the baskets, thereby necessitating several trips to the grocery and causing sales to be relatively low per customer visit. $ Provide a "grocery cart," that is, a large wire basket in a frame on wheels so that it can be rolled about and carry a large amount of groceries. (Sylvan Goldman, 𝕀. When Mr. Goldman first introduced his carts (about 1925), shoppers wouldn't use them and stores wouldn't buy them despite his extensive efforts. He eventually found a way to get his carts accepted: He hired crews of "shoppers" to wheel the carts about and fill them in his store, and also hired a woman to offer the carts to entering shoppers. Goldman then made millions from patents on his cart and its improvements (nesting carts and airport carts). This illustrates the crucial value of perseverance and marketing genius.)
14. **Belt Loops.** ℙ Until 1922, men's pants (then called pantaloons) were held up by either unsightly suspenders or an awkward rope tied around the top of the pants. $ Provide "loops" at the top of the pants so that a "belt" could be inserted through the loops. (Unknown inventor).

The inventors of these inventions necessarily went through the problem-solution process (though not necessarily in that order) to make their invention. Even if an inventor believes the invention came spontaneously, you'll usually find that problem-solution steps were somehow involved, even if they appear to coalesce.

So, if you either don't have an invention or want to make some new ones, you should begin by ferreting out problem or "need" areas. This can often be done by paying close attention to your daily activities. How do you or others perform tasks? What problems do you encounter and how do you solve them? What needs do you perceive, even if they're as simple as wanting a full month's calendar on your calendar watch? Ask yourself if something can't be done more easily, cheaply, simply, or reliably, if it can't be made lighter, quicker, stronger, etc. Write the problems down and keep a list. Make sure you take the time to cogitate on the problems or needs you've discovered.

Sometimes the solution to the problem you identify will be a simple expedient, such as electrification or reduction in size. Generally, however, it will be more involved, as in some of the examples listed above. But you don't have to be a genius to come up with a solution. Draw on solutions from analogous or even nonanalogous fields. Experiment, meditate, look around. When a possible solution strikes you, write it down, even if it's in the middle of the night. History records a great number of important scientific and conceptual breakthroughs occurring during sleep or borderline-sleep states.

Also, remember that sometimes the "problem" may be the ordinary way something has been done for years, and which no one has ever recognized as a problem. Consider shower heads. Although essentially the same device operated satisfactorily for about 50 years, the inventor of water-massaging shower heads recognized the deficiency of an ordinary constant spray that didn't create any massage effect. He thus developed the water-massaging head that causes the water to come out in spurts from various head orifices, thereby creating the massaging effect.

Don't hesitate to go against the grain of custom or accepted practice if that's where your invention takes you. Many widespread erroneous beliefs have abounded in the past which were just waiting to be shattered. The medical field, in particular, had numerous nonsensical practices and beliefs, such as the use of "poudrage" (pouring talcum powder onto the heart to stimulate it to heal itself), bloodletting, and blistering, and the belief that insanity could be cured by drilling holes in the head to let the demons out. In more recent times the medical establishment believed that ulcers were caused by stress and spicy foods, but Drs. Barry J. Marshall and J. Robin Warren of Australia discovered that a bacterium was the culprit, earning them a Nobel prize. As *Forbes* magazine noted (2005 Nov 14) "great breakthroughs very often come from outsiders, entrepreneurial folk, not part of the establishment of mainstream thought."

You'll probably find the going easier if you invent in fields with which you're familiar. In this way you won't tend to "reinvent the wheel." Also, think about uncrowded fields or newly emerging ones where you

will find ample room for innovation. But even if you work in an established area, you will find plenty of opportunity for new inventions.

Many inventors have discovered problems (and come up with solutions) by observing current events in the media. A number of years ago there were problems with medical personnel being stuck and infected by hypodermic needles that slipped or were used against them by disturbed patients. The result—a rash of patents on safety needles. Current problem areas such as terrorism, voting machines, alternative energy, identity theft and credit card fraud, and guerrilla warfare are creating potential markets for inventive individuals. For example, a market exists for a simple, tamper-proof, easy-to-use voting machine or a foolproof way to vote online. If you have technical ability, another way to invent is to "follow the cutting edge." Biotechnology, nanotechnology, alternative energy, energy conservation, and water purification are current hot areas.

One important principle to successful inventing is to remember the acronym KISS (Keep It Simple, Stupid!). If you can successfully eliminate just one part from any machine, its manufacturer (or a competing manufacturer!) will be overjoyed: the cost of the machine will be reduced, it will be lighter, and, of course, it will be more reliable. Another way to look at this is Sandra Bekele's (an inventor-friend) admonition to (figuratively) "eliminate the corners." Or, to quote jazz great Charlie Mingus, "Anybody can make the simple complicated. Creativity is making the complicated simple."

Lastly, says highly successful toy inventor Richard Levy, don't go into inventing for money alone; you've got to enjoy the game and the hunt to make it all truly worthwhile.

C. Inventing by Magic (Accident and Flash of Genius)

When we don't understand how something is done, we sometimes call it "magic." Inventions made by "magic" don't involve the problem-solution technique that we just described; rather, they usually occur by "accident" or by "flash of genius." The PTO and the courts really don't care how you come up with an invention, so long as they can see that it wasn't already accomplished and it looks substantially different from what's been done before. In the hopelessly stilted language of the law, "Patentability shall not be negatived by the manner in which the invention was made." (35 USC 103.)

Many famous inventions have resulted from accident or coincidence. For example, Goodyear invented rubber vulcanization when he accidentally added some sulphur to a rubber melt. In the late 1800s, a chemist supposedly accidentally left a crutcher (soap-making machine) on too long, causing air to be dispersed into the soap mixture. He found that the soap floated when it hardened, thus giving birth to floatable soap bars, such as Ivory® brand. In the 1890s the brothers W.K. and J.H. Kellogg, who ran a health sanitarium in Battle Creek, Michigan, accidentally left some of their health bread dough out overnight. They tried to salvage the stale dough by rolling it into loaves but found that it flaked into small pieces. Instead of discarding the flakes, J.H. fed them to his patients, who loved them, so they refined, ramified, and marketed them, eventually selling them as Kellogg's Cornflakes. In 1912, another chemist, Jacques Brandenberger, accidentally mixed some chemicals together and spilled them, finding they hardened to a flexible, transparent sheet (later known as "cellophane"). When Alexander Fleming accidentally contaminated one of his bacterial cultures with a mold, he was sufficiently alert and scientifically minded to notice that the mold killed the bacteria, so he carried this discovery forward and isolated the active ingredient in the mold, which later was named penicillin. (Unfortunately he didn't patent it, so he got the fame, but not the fortune.)

And in 1948, Georges de Mestral, after taking a walk in the forest of his native Switzerland, noticed some cockleburs had stuck to his pants. Being of scientific mind, he removed and examined them and figured out why they adhered so well. He applied his newly discovered knowledge and as a result invented and made a fortune from hook-and-loop fasteners, which his company sold under the trademark Velcro.

In 1938 chemist Roy Plunkett, while experimenting with refrigerant fluids at a DuPont lab in New Jersey, left some fluorine-based gas in a freezer and came back

to find a solid, slippery polymer that was extremely resistant to bonding and to which nothing would stick. Known initially as PTFE, it later earned billions for DuPont under the trademark Teflon.

The law considers the fact that these inventions came about by total accident, without the exercise of any creativity by their "inventors," legally irrelevant. All other things being equal, a patent on cellophane would be just as strong as one on nylon (another former trademark), the result of 12 years' intensive and brilliant work by duPont's now-deceased genius, Dr. Wallace Carothers of Wilmington, Delaware.

Since we don't understand how the "magic" occurs, we can't tell you or even suggest how to invent by accident. Please remember, however, that in case you ever come up with an accidental development, take the time and apply the effort to study, analyze, and try to "practicalize" it. If it has potential value, treat it like any other invention; the law will.

The other type of "magical" invention we'll refer to as the product of a "flash of genius." While "flash of genius" inventions inherently solve a need, the inventive act usually occurred spontaneously and not as a result of an attack on any problem. Some examples of this type are the electric knife and the previously discussed Salton inventions which actually created their own need, the Pet Rock (not a real invention by traditional definitions, but rather a clever trademark and marketing ploy, but highly profitable just the same), Bushnell's "Pong" game, the Cabbage Patch dolls, Ruth Handler's Barbie Dolls, and a client's Audochron® clock, which announces the time by a series of countable chimes for the hours, tens of minutes, and minutes. With these inventions, the inventor didn't solve any real problem or need, but rather came up with a very novel invention which provided a new type of amusement or a means for conspicuous consumption (showing off).

Although we don't understand how the creativity in these types of cases occurs, we suggest several techniques for stimulating and unlocking such creativity. Using these techniques, many inventors have come up with valuable inventions and profitable ideas and marketing ploys.

"Chance favors only the prepared mind."

—Louis Pasteur

D. Making Ramifications and Improvements of Your Invention

Once you've made an invention, write down the problem and solution involved. Then, try to ramify it—that is, to do it or make it in other ways so it will be cheaper, faster, better, bigger (or smaller), stronger, lighter (or heavier), longer- (or shorter-) lasting, or even just different. Why ramify?

1. Most inventors usually find that their initial solution can be improved or made more workable.
2. By conceiving of such improvements first, you can foreclose future competitors from obtaining patents on them.
3. Even if you believe your first solution is the best and most workable, your potential producers or manufacturers may not see it that way. So, it's best to have as many alternatives handy as possible.
4. When you apply for a patent, the more ramifications you have, the easier it will be to make your patent stronger.
5. Conversely, if the broad concept or initial embodiment of your invention is "knocked out" by a search of the "prior art" made by you, your searcher, or the examiner in the Patent and Trademark Office, you'll have something to fall back on, so you'll still be able to get a patent.
6. Ramifications often help you understand your basic invention better, see it in a new light, see new uses or new ways to do it, etc.
7. Ramifications can be held back and introduced later, after the basic invention has been "milked" commercially, thereby prolonging the profits, as duPont did with its Teflon®II. Be sure to try to patent the ramifications as soon as possible, however, to foreclose someone else from doing so.

In some situations, you'll find that you won't be able to ramify beyond your basic conception. But give it a try anyway, and make sure you record in writing any ramifications you do come up with as soon as possible.

One way to make ramifications is to pretend that a part of your device can't be made due to a law or crucial material shortage and then try to come up with a replacement.

In addition to making ramifications to your invention, you should, after you've finished with filing a patent application or you've gotten it out on the market, try to make improvements—that is, more substantial changes. Why? There are several reasons: (1) To extend your monopoly and keep the gravy flowing longer; (2) To enhance your credibility as an inventor—if you have several patents it will make any infringer look worse in litigation and make it easier for you to win your lawsuit; (3) Improvement patents cut off avenues that another company can use to design around your base patent; (4) A bank or financier will be more likely to lend you money if you have several patents.

E. Solving Creativity Problems

Unfortunately, hardly any invention ever works right or "flies" the first time it's built. You need to build and test it to be aware of the working problems. If you don't, the first builder, whoever it is, will inevitably face them. If this is a corporation to which you've sold or licensed your invention, it's sure to create problems. If your first construction doesn't work, don't be discouraged; expect problems and expect to solve them through perseverance. If you don't believe me, consider Edison's views on this subject:

> *"Genius? Nothing! Sticking to it is the genius! Any other bright-minded fellow can accomplish just as much if he will stick like hell and remember nothing that's any good works by itself. You've got to make the damn thing work!... I failed my way to success.... Genius is one percent inspiration and ninety-nine percent perspiration."*

If you show your invention to someone and you get static in return, don't necessarily get discouraged; the history of invention abounds with quotes from naysayers who were proved to be disastrously wrong. The enlightening book *303 of The World's Worst Predictions*, by W. Coffey, is full of amusing and insightful erroneous quotes. Here are a few teasers:

> *"Everything that can be invented has been invented."*
>
> **—U.S. Patent Office Director, urging President McKinley to abolish the Office (1899)**

> *"What, sir? You would make a ship sail against the wind and currents by lighting a bonfire under her decks? I pray you excuse me. I have no time to listen to such nonsense."*
>
> **—Napoleon Bonaparte to Robert Fulton, after hearing Fulton's plans for a steam engine–driven boat**

> *"I think there is a world market for about five computers."*
>
> **—Thomas J. Watson, IBM President (1956)**

> *"Man won't fly for a thousand years."*
>
> **—Wilbur Wright to Orville after a disappointing experiment in 1901**

Many have analyzed the creative process, but so far no one has come up with a foolproof recipe or technique for innovating. However, almost all writers recommend that, unless you already have a "flash of genius," you first thoroughly prepare and familiarize yourself with the field, always keeping an open mind. Thereafter, some writers recommend you wait a while (allot an incubation period) to let your mind digest and work on the problem. Following incubation, work on the problem again and insight may come, sometimes in bits and pieces. "To discover something you've never seen before, walk the same path you walked yesterday." R.W. Emerson. Alternatively, some experts recommend that, after preparation, one make a concentrated effort, which may lead to frustration and withdrawal. But be patient, since the insight, which may be an image or a fantasy, will usually come thereafter. Of course follow-through is necessary to implement and profit from the insight or fantasy.

If you have creativity problems, such as how to make that great idea work, here are some specific techniques you can use to enhance your creativity, and hopefully solve that problem.

Frame It Differently: One of the most effective ways to solve a problem is to "frame" the problem properly. Framing is another way of describing the way in which one looks at a situation. A common example of framing a problem occurs when you try to move a bulky sofa through a small doorway. If the first way doesn't work, frame the problem differently by turning the sofa upside down and trying again. Or take another example: If you have an apparatus that includes a lever, and you can't find a design shape for the lever that the machine will accommodate, look at the situation another way; perhaps you can redesign the apparatus to eliminate the lever altogether!

Use Your Right Brain: In the course of trying to solve a problem with an invention, you may encounter a brick wall of resistance when you try to think your way logically through the problem. Such logical thinking is a linear type of process (that is, one step follows another), which utilizes our rational faculties, located in the left side of our brains. This works fine when we're operating in the realm of what we know or have experienced. However, when we need to deal with new information, ideas, and perspectives, linear thinking will often come up short. On the other hand, creativity by definition involves the application of new information to old problems and the conception of new perspectives and ideas. For this you will be most effective if you learn to operate in a nonlinear manner, that is, use your right brain or creative faculties. Stated differently, if you think in a linear manner, you'll tend to be conservative and keep coming up with techniques which are already known. This, of course, is just what you don't want.

One way to engage your right-brain faculties in a search for a creative solution to your quandary is to pose the problem in clear terms and then forget about it and think of something completely different. For example, if you can't fit that lever in your apparatus, think of a different activity, or just take a break (how about a nice boating trip or a hike in the woods). Your subconscious will work on the problem while you're "away." Then come back to the problem and force your different activity onto your problem. In other words, try to think of the apparatus and your boating trip or hike simultaneously. You may find that a solution appears by magic (for example, you may realize a way to design the machine without the lever!).

Let Go of Assumptions: If you adhere to assumptions, you'll never innovate, since innovation, by definition, is the adoption of something new, the embarkation on an untrodden path. As Erich Fromm said, "Creativity requires the courage to let go of [assumed] certainties." So if you've got a problem, try to see what assumptions you're making (they're usually hidden) and then let them go or try to cancel them and see what you come up with.

Meditation: Another way to bring out your creativity is to meditate on the problem or meditate merely to get away from the problem. Either will help. As strange as it seems, some experts say that creativity can be enhanced during reverie by listening to a largo movement from a baroque symphony. At least you'll enjoy it! Also, the use of biofeedback machines can induce or teach deep relaxation with enhanced alpha, or even theta brain waves, a very effective stimulus to creativity.

Dreams: Some creative people find dreams the most effective way of all to solve problems. Or as Edison said: "I never invented anything; my dreams did."

Elias Howe solved the basic problem of his sewing machine in a dream. He saw some tribal warriors who ordered him to come up with a solution or they would kill him. He couldn't make a solution, so the warriors then threw their spears at him. When the spears came close, he saw that each had a hole near its tip. He awoke from the nightmare in terror, but soon realized the symbology: He put a hole near the tip of his bobbin needle and passed the thread through. Again, the rest is history.

Similarly, Mendeleev came up with the periodic table of the elements in a dream.

To stimulate creative dreaming, first immerse yourself in the problem near bedtime. Then forget about it—do something completely different and go to sleep. Your subconscious will be able to work on the problem. You'll most likely have a dream with an inspiration or insight. Then remember the dream and evaluate the insight to find out if it's correct (sometimes it won't be!).

Note that you'll forget most dreams, so keep a dream diary or notebook handy, by your bedside. Also, you'll find a pen with a built-in flashlight is also helpful. Before you go to bed, repeat fifteen times, "I'll remember my dreams." Whenever you do dream, wake up (you'll find it possible to do this if you intend to do so beforehand) and write your dreams down promptly. Once they are written down, forget about them, go back to sleep, and try to figure them out in the morning. Sometimes a week or more will pass before the meanings become clear. Or talk your dreams over with an equally inventive friend and see if he or she can get the meaning—sometimes talking about it helps.

While sleep dreams are usually the most productive, often daydreams will bring valued insight. So, don't dismiss your daydreams either!

Good luck. And pleasant dreams!

Computerized Creating: As strange as it may seem, computer technology can be used to enhance creativity, solve problems, bust through conceptual roadblocks, and get into the recesses of your memory. Several "mindware" or "CAT" (computer-aided thinking software) programs and books for this purpose exist, and I believe they can be of significant help in this area. The programs work by first asking you to enter lots of details of your problem or area and then they rearrange the details and suggest lots of modifications and permutations for you to consider. To find these programs and books, simply search "idea generator" in any search engine.

The Hot Tub Method: This has been used by many creative geniuses, starting with Archimedes who discovered the principle of volumetric measurement while in his tub. It works like this: When you relax in a hot tub for a long period, the heat on your body mellows you out and dilates your blood vessels so as to draw blood from your analytical brain, allowing your creative subconscious to come to the fore.

Unstructured Fanaticism: As "excellence guru" Tom Peters states, structured planners rarely come up with the really great innovations; monomaniacs who pursue a goal with unstructured fanaticism often do. So let yourself go and become an unreasonable madman—it may do the trick!

Group Brainstorming: If all else fails, get a group of friends or trusted associates together (or on a computer network) and throw the problem to the group. For some unknown reason, a group of people working together often come up with more good ideas than the same individuals working separately. This synergistic method is often used in corporations with great success. The use of others to help innovate has been called "leveraging knowledge," since one's knowledge and abilities are multiplied by others in a group. There is even brainstorming software available now.

Increase Self-Confidence: Those with more self-confidence and self-esteem tend to be more venturesome, and hence more creative. If you suffer from low self-confidence or low self-esteem, you may wish to explore local courses or read some self-improvement books.

20 Questions: Dixie Hammond of Focus Works in Van Nuys, California, suggested 20 questions you can ask to encourage ideas:

1. What if ...?
2. Can we improve ...?
3. How will a customer benefit?
4. Are we forgetting anything?
5. What is the next step?
6. What can we do better?
7. What do you think about ...?
8. How can we improve quality?
9. How can we streamline?
10. What should we modify?
11. What should we replace?
12. What should we add?
13. What should we eliminate?
14. Can we make any new assumptions?
15. What will make it work?
16. What other ideas do you have?
17. What issues should we explore?
18. What patterns can you see?
19. How can we simplify?
20. Why?

Idea Tools: Most inventions don't work well as originally developed. Here are some suggestions for modifying your invention to make it work better:

- **Divide:** Divide it into smaller components or separate functions.

- **Combine:** Combine separate ideas, parts, or functions.
- **Simplify:** Simplify it—for example, by making it smoother, or streamlined.
- **Substitute:** Use different materials, parts, functions, or ingredients.
- **Add:** Add additional parts, movement, color, flavor, sound, functions, textures, or ingredients.
- **Subtract:** Remove parts or steps.
- **Reverse:** Reverse the mode of operation or position, or transpose cause and effect.
- **Minimize:** Make it smaller, lighter, or lower.
- **Maximize:** Make it bigger, stronger, better, higher, in multiples; exaggerate it.
- **Redesign:** Redesign the exterior or interior, change the symmetry, speed, shape, function, or perspective; give it new meaning.

F. Contact Other Inventors

In recent years, many inventors' organizations have developed or sprung up in order to provide inventors with information and ideas, model makers, lists of searchers, speakers, patent attorneys, etc., as well as to sponsor various seminars and trade fairs where inventions can be exhibited. One or more of these organizations may provide you with invaluable assistance in your inventing efforts.

One of the oldest and most well-known groups of inventors is the Minnesota Inventors Congress (www.invent1.org). Inventors' organizations have a reputation for honesty and provide reasonable value for the membership or other fees charged, but check for yourself before investing a significant amount of your time or money. A listing of inventor organizations, can be found at Inventor's Digest Online, www.inventorsdigest.com. (Click on "Resources.")

You can also find inventors' groups in your area by asking the Patent and Trademark Resource Center close to you. You can find a listing of PTRCs in Chapter 6 or by visiting the PTO website (www.uspto.gov) and clicking on "Support Centers" under the "Learning and Resources" tab.

If you wish to subscribe to an online mailing inventors' group, here are two excellent ones: Invent NET (www.inventnet.com), and InventorEd (www.inventored.org/forums/Inventors-L.html).

G. Beware of the Novice Inventor's "PGL Syndrome"

As the late successful inventor (he created the "Wizzzer" toy top among others) Paul Brown discovered, many novice inventors have a very different attitude from experienced inventors. He called this attitude the "PGL (Paranoia, Greed, Laziness) syndrome." Let's discuss the components of Mr. Brown's syndrome in more detail, since each usually is a significant hindrance for inexperienced inventors.

Paranoia: Extremely common with inexperienced inventors, paranoia (excessive suspicion of other people's motives) makes them afraid to discuss or show their invention to others—some even go as far as refusing to disclose it to a patent attorney. We do advise some measure of caution with unpatented inventions. However, once you record your invention properly (as discussed in Chapter 3), you can and should disclose it to selected persons, provided you take adequate measures to document whom you've disclosed it to and when. Don't be as paranoid as my friend Tom who invented a very valuable stereo movie invention but kept it totally to himself out of fear of theft, only to see it patented and commercialized by someone else.

Greed/Overestimation: Most people have heard fabulous stories of successful inventors who've collected millions in royalties. For example Los Angeles orthopedic surgeon and independent inventor Dr. Gary Michelson was awarded $1.35 *billion* in a settlement with Medtronic Inc. over some spinal fusion inventions. As a result, some novice inventors think that their invention is worth millions and demand an unreasonably large royalty or lump-sum payment for their creation. This is seldom wise. It is much better to set your sights at a reasonable level (see Chapter 16) so you won't miss out on commercial opportunities.

Laziness: Some novice inventors believe that all they need to do is show their invention to a company, sign a lucrative contract, and let the money roll in. Unfortunately it hardly ever happens so easily. To be successful, you usually have to record your invention properly, build and test a working model (desirable but not always necessary), file a patent application, seek out suitable companies to produce and market the invention, and work like hell to sell the invention to one of these companies.

H. Don't Bury Your Invention

If you believe that you have what will turn out to be a successful idea, but you have doubts because it's very different, or you get negative opinions from your friends, consider that Alexander Graham Bell was asked by an irate banker to remove "that toy" from his office. The "toy" was the telephone. Or if that doesn't convince you, ponder these words of Mark Twain, Albert Einstein, and John Shedd:

"The man with a new idea is a crank—until the idea succeeds."

—Mark Twain

"For an idea that does not at first seem insane, there is no hope."

—Albert Einstein

"Opportunities are seldom labeled."

—John Shedd

And as a successful inventor, Nolan Bushnell, *(Pong)* said, "Everyone who's ever taken a shower has an idea. It's the person who does something about it who makes a difference."

Don't forget that, in addition to making money if you're successful, an invention can create jobs, make our lives easier and more interesting, and eliminate drudgery. Consider the Linotype® machine, where each machine eliminated 90 manual typesetters and their arduous task and spawned a new industry and profession. Then came the computer, where each modern computer replaced nine Linotype machines, spawned another new industry and gave almost anyone the ability to create typeset documents. If you still doubt the value of inventors and inventions, consider this: without inventors and their inventions, we would still be living the way we lived 50,000 years ago!

We hope you've received our message in this chapter loud and clear. If you have a worthwhile invention, and you scrupulously follow all the advice and instructions given in this and the succeeding chapters, and persevere, we believe you'll have a very good chance of success.

"Each invention leads to new inventions and each discovery to new discoveries; invention breeds invention, science begets science, the children of knowledge produce their kind in larger and larger families; the process goes on from decade to decade, from generation to generation."

—Alfred Korzybski

I. Summary

The day of the lone inventor is not over; many successful inventions and industries have been started by independent inventors.

Most inventions are created after recognizing a problem and finding a solution. However, inventions are also made by "magic" (accident and flash of genius), the process of which is not easily analyzed.

If you make an invention, try to conceive of ramifications to enhance its value. If you have trouble solving invention problems, persevere, frame the problem differently, use nonlinear techniques, let go of assumptions, try meditation, employ your dreams, the computer, use brainstorming, inventors' organizations, and other techniques. Beware of the novice inventors' PGL Syndrome (paranoia, greed, laziness). Above all, persevere!