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<tr>
<th><strong>Title</strong></th>
<th>The Innovations and Inventions of Steve Jobs [IP Corner]</th>
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<tbody>
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Much of the world of patents is shrouded in layers of legal mysticism, semantic nuances, and subtle complexities. Those of you who are regular readers of “IP Corner” will know that I often try to explain the principles of the patenting process using real-world examples and case studies. I feel that this is probably the most useful approach to explain the many shades of gray of this world to engineers.

Normally I focus on a particular aspect of patents and the patenting process and explore it through a series of examples. However, for this issue, I thought it might be interesting to take a different approach—why not explore a selection of the innovations of a well-known inventor to gain a different perspective and provide insight into the art and business of patenting your own inventions?

And there is no better candidate for our first study than the man who found and later rebuilt the most successful consumer electronics company of the 21st century—Steve Jobs.

JOBS THE DESIGNER

AGE OF THE PERSONAL COMPUTER

Our journey begins in the 1980s, and, interestingly, it starts with a form of intellectual property (IP) that we have not discussed in detail before—the design patent. One of the first significant pieces of IP is U.S. Patent D268584 for a personal computer. (Figure 1).<AU: Please check whether the citation of Figure 1 is correct.> This closely resembles the Apple III, which was released in 1981.

Recent design patents are different from the normal form of patent that we discuss in this column, the utility patent. The main distinction is that a design patent is limited to protecting the physical form and appearance of a product. Thus, the most important aspect of such patents is the drawings. In fact, most design patents, such as U.S. Patent D268584, only contain a title page and a series of drawings. In this case, there is a simple statement of claim: “The ornamental design for a personal computer, substantially as shown.” This particular patent has four contributing designers: Steven P. Jobs, Jerold C. Manock, Dean A. Hovey, and David M. Kelley.

As you might expect, Apple has always been very concerned with protecting the unique appearance of its products and, thus, has many design patent filings. We can find a long list of computer designs from the 1980s until today. A selection of these is shown in Figure 2.

There is no doubt that Jobs was a very prolific designer and had tremendous artistic flair and creativity. It is interesting to note that the later designs seem to become more “boxlike.” This also illustrates an aspect of design patents of which many of you may not be aware—you can obtain a patent to cover the design of your box as long as it has some distinctive features that are not normally found on a box. There is an examination process for design patents, but it is somewhat less rigorous than for a utility patent.

It can be more challenging to defend such patents—many aspects of a design are somewhat subjective. For example, how round does a rounded corner have to be before it infringes? Thus, the best design patents have very unique and distinctive features.

NEW DEVICES—FROM iPOD TO iPAD

While working through the IP for this article, I realized how many design patents Apple has on its books and, more importantly, how central these are to the core products from the company.

The basic iPod design is illustrated in Figure 3(a). Perhaps the only truly distinctive feature is the circular user interface switch. Yet it was arguably the ease of
access provided by this “thumvable” user interface that was central to the success of the “physical” iPod. After all, there were MP3 players before the iPod and yet it was the first media appliance since the Sony Walkman to achieve genuine universal brand recognition. Naturally, the introduction of iTunes and the licensing deals struck by Apple with content owners from the music industry were also central to this success. (See “Intellectual Property and the iPod”)<AU: Please check whether the sidebar citation is correct.>

Many designers would have been happy with the success of an iconic product such as the iPod, but it is clear now that it was only the first step in Jobs’ vision to create the leading consumer electronics company of the 21st century. The iPod was introduced in 2001, but within five years, Apple had turned its energies to the personal communications industry.
In 2007, the company introduced a replacement for the mobile phone that would rock the consumer electronics and telecommunications industries—the iPhone. (See “Intellectual Property and the iPhone.”) <AU: Please check whether the sidebar citation is correct.>

As with all key Apple products, Jobs was in the thick of things and is one of the named designers on a long list of design patents protecting the iconic single-button appearance of the iPhone. More interestingly, the company took an unusual approach to patenting the operation and internal functionality of the iPhone. Most companies protect individual technologies, such as UI, internal workflows, communication subsystems, device interfaces, hardware components, and networking, with separate patents. For the iPhone, Apple filed a single main utility patent, U.S. Patent 7,479,949, but it is 360 pages long with more than 290 pages of drawings and figures.

We will discuss this particular document shortly, but for now, it shows how Apple’s approach to IP differed from many companies. It filed prolifically to protect the form and ergonomics of its products as these have always distinguished Apple from its competitors. In fact, Apple has never been a leading foundation technology company—the company does not specialize in developing new materials for hardened glass or improved batteries; nor is it specialized in the fabrication of integrated circuits for advanced processing units, motion sensors, or device communications; nor in imaging and camera technologies; nor in touch-sensing interfaces and biometric scanners. What Apple is good at is working with these technologies and blending them into a compelling, seamless, and perfectly integrated system-level device. And this is exactly what was patented by U.S. Patent 7,479,949.

PERIPHERALS—KEYBOARDS AND MICE

We shall return in due course to discuss the iPhone, but first let us consider how design and invention permeated so much of Jobs’ work and life. He was a stickler for details, and this stands out when we look at some of the less well-known IP filed by Apple. Even the basic peripherals of a computer system, the mouse and keyboard, were given new designs.

The Magic Mouse [Figure 4(a) and (b)] literally reinvents the mouse by incorporating a multitouch interface into the mouse surface. Thus, in addition to the normal cursor movement and point-and-click function, this mouse is also

INTELLECTUAL PROPERTY AND THE IPHONE

Apple has filed more than 200 patent applications related to the technology behind the iPhone. LG Electronics claimed that the design of the iPhone was copied from the LG Prada. Woo-Young Kwak, head of LG Mobile Handset R&D Center, said at a press conference: “We consider that Apple copied Prada phone after the design was unveiled when it was presented in the iF Design Award and won the prize in September 2006.”

Infogear Trademarks on iPhone

On 3 September 1993, Infogear filed for the U.S. trademark “I PHONE” and on 20 March 1996, applied for the trademark “IPhone.” “1 Phone” was registered in March 1998, and “iPhone” was registered in 1999. Since then, the I PHONE mark had been abandoned. The Infogear trademarks cover “communications terminals comprising computer hardware and software providing integrated telephone, data communications, and personal computer functions” (1993 filing), and “computer hardware and software for providing integrated telephone communication with computerized global information networks” (1996 filing).

In June 2000, Cisco Systems acquired Infogear, including the iPhone trademark. On 18 December 2006, they released a range of rebranded voice over IP (VoIP) sets under the name iPhone.

Shortly after Steve Jobs’ 9 January 2007 announcement that Apple would be selling a product called the iPhone in June 2007, Cisco issued a statement that it had been negotiating trademark licensing with Apple. On 10 January 2007, Cisco announced it had filed a lawsuit against Apple over the infringement of the trademark iPhone. More recently, Cisco claimed that the trademark lawsuit was a “minor skirmish” about interoperability.

On 2 February 2007, Apple and Cisco announced that they had agreed to suspend litigation while they held settlement talks, and subsequently announced on 20 February 2007 that they had reached an agreement. Both companies will be allowed to use the “iPhone” name in exchange for “exploring interoperability” between the partners and their security, consumer, and business communications products.

Apple Trademarks on iPhone

In October 2002, Apple applied for the “iPhone” trademark in the United Kingdom, Australia, Singapore, and the European Union. A Canadian application followed in October 2004, and a New Zealand application in September 2006. As of October 2006, only the Singapore and Australian applications had been granted. In September 2006, a company called Ocean Telecom Services applied for an “iPhone” trademark in the United States, United Kingdom, and Hong Kong, following a filing in Trinidad and Tobago.

As the Ocean Telecom trademark applications use exactly the same wording as the New Zealand application of Apple, it is assumed that Ocean Telecom is applying on behalf of Apple. The Canadian application was opposed in August 2005 by a Canadian company called Comwave who themselves had applied for the trademark three months later. Comwave has been selling VoIP devices called iPhones since 2004.

On 22 October 2009, Nokia filed a lawsuit against Apple for infringement of its GSM, UMTS, and WLAN patents. Nokia alleges that Apple has been violating ten of Nokia’s patents since the iPhone’s initial release. [301]

Other News

In August 2012, Apple won a smartphone patent lawsuit in the United States against Samsung, the world’s largest manufacturer of smartphones. In March 2013, an Apple patent for a wraparound display was revealed.
capable of multitouch gesture control. You can scroll up/down or left/right with a single finger. Using two fingers, you get page-up/page-down functionality, and in different contexts you can also zoom in or out, all without moving the mouse.

Its clean design and wireless connectivity make a clear statement that even with such a basic peripheral, you can enhance the user experience and bring it to a new level through a combination of thoughtful consideration of form and function, careful application of new materials and technologies, and creative redesign. This mix is at the core of Apple’s system-level philosophy and underlying inventiveness.

It is also important to realize that concepts such as the iPhone or the Magic Mouse were not created overnight. In Figure 4(d), we see an earlier patent filing from 1999, which embodies much of the redesign of the Magic Mouse. There can be no doubt that Jobs was a genius, but as attributed to Edison, “genius is 99% perspiration and only 1% invention.” The seeds of many of these ideas originated back in the 1980s and 1990s, and it took years, even decades, for them to eventually evolve and see the light of day as today’s products.

BUILDINGS, STAIRS, AND PACKAGING

The fascinating thing about Jobs is that he did not confine this philosophy to the devices and peripherals manufactured by Apple. If you are going to sell some of the most beautiful and user-friendly products in the world, you had better have the right surroundings and atmosphere to enable your customers to make their purchasing decisions. In line with Apple’s devices, the retail environment in which they are sold should embody the same unity of form and function.

Thus, Jobs is also named on Apple patents on the form of a building for a retail store—yes, you can obtain a design patent for a building, as evidenced by U.S. Patent D648,864 filed in October 2010. The main drawing from this patent is shown in Figure 5(a), which illustrates a large glass frontage that literally brings the store out into the street. Again that unity of form and function!

And it did not stop with stores: Jobs is also named on design patents for packaging [Figure 5(c) and (d)] and both design and utility patents on the glass staircases [Figure 5(b)] that are an integral part of the design and internal structure of many Apple retail stores. Well, if you are going to buy something beautiful you might as well be somewhere beautiful at the same time—now that really is “retail therapy.”

JOBS THE INVENTOR—UNIQUE USER INTERFACES

So far, we have emphasized the design aspects of Jobs’ contributions. This is only fitting as Apple is best known for its design as well as the beauty and usability of its products. But Jobs was
also an inventor. Technical invention is not so apparent in the earlier days of Apple and some innovations, such as the use of a “mouse” as a core element of the user interface for the original Macs, were in point of fact licensed from third parties.

But Apple improved on that which the company licensed in and after Jobs’ return in the late 1990s, Apple filed an increasing number of utility patents. In fact, there is a Web site dedicated to the latest patent IP from Apple: www.patentlyapple.com.

Because so much of the essence of Apple is centered around the improved user experience that the company offers over its competitors, it is not surprising that many of its patents are directed to user interface aspects of a computing system or a consumer device. Naturally, Jobs has contributed as a co-inventor on several of the most significant of these.

**USER INTERFACES FOR COMPUTERS**

FIGURE 6. (a) A typical computer display with multiple windows associated with multiple application processes; Window 1 lies on top of the other windows and represents the currently active application process. (b) This illustrates the new technique of the invention where all of the inactive windows of (a) are now minimized and appear in a taskbar along the bottom of the display; the active application process has now switched to window 5. (c) Illustrates a user interface including a userbar according to an example embodiment of the present invention. (d) An example magnification effect mechanism according to the present invention. (e) A block diagram of the general architecture of a computer system in which U.S. Patent 7,607,102 is implemented. (f) <AU: Please provide a description subpart “f.”>
2000. This is perhaps one of the first utility patents filed by Apple in the 21st century.

The key concepts of this patent are illustrated in Figure 6(a) and (b) and describe a computer–human interface that manages the available space on a computer display in a manner that reduces the clutter and confusion caused by multiple windows. The interface includes a user-selectable mode of operation in which only windows associated with the currently active task are displayed on the computer monitor. When a user switches from the current task to a new task, by selecting a minimized window, the windows associated with the current task are automatically minimized and the window pertaining to the new task is displayed at its normal size. As a result, the user is only presented with the window that relates to the current task of interest, and clutter provided by nonactive tasks is removed.

While this may remind some readers of the older Mac interface and approach to multitasking, we can see in Figure 6(b) the initial concept of the
dock that is a key feature of today’s Mac OS. This concept is further developed in our second utility patent attributed to Jobs—U.S. Patent 7,434,177 “User interface for providing consolidation and access,” to Steven P. Jobs, Scott Forstall, Greg Christie, Bas Ording, Imran Chaudhri, Stephen O. Lemay, Marcel van Os, Freddy Allen Anzures, and Mike Matas. Figure 6(c) and (d) shows the Mac OS dock with its signature growing icons. A simple, yet elegant concept is embodied in this instance into a detailed utility patent. The main claim is concise and gets directly to the point:

- a computer system comprising:
  - a display
  - a cursor for pointing to a position within said display
  - a bar rendered on said display and having a plurality of tiles associated therewith
  - a processor for varying a size of at least one of said plurality of tiles on said display when said cursor is proximate said bar on
One example is U.S. Patent 7,607,102: "Portable Multifunction Device". The patent was filed in December 1999, but it was not published until October 2008. Thus, it predates U.S. Patent 6,957,395, although they are clearly complimentary.

There are, of course, many other UI patents from Apple and Jobs himself. One example is U.S. Patent 7,607,102: "Portable Multifunction Device". The patent was filed in December 1999, but it was not published until October 2008. Thus, it predates U.S. Patent 6,957,395, although they are clearly complimentary.

Simple and to the point. Interestingly, this patent was filed in December 1999, but it was not published until October 2008. Thus, it predates U.S. Patent 6,957,395, although they are clearly complimentary.
“Dynamically changing appearances for user interface elements during drag-and-drop operations,” to Bas Ording and Steven P. Jobs with a filing date of March 2002 [Figure 6(e)]. This patent describes UI elements whose appearance dynamically changes dependent upon the functions associated with the elements. In the case of an icon that is the destination for a drag-and-drop operation, the image displayed for the icon changes in accordance with the object being dragged to it to represent the task that will be performed as a result of the drag-and-drop operation. Thus, the user is provided with more intuitive feedback regarding the functions that will be performed by the computer as a result of a drag-and-drop operation.

Another more recent patent, U.S. Patent 8,060,830: “News Feed Browser,” to Jessica Kahn, Jens Alfke, Steven P. Jobs, Scott James Forstall, Gregory N. Christie, Stephen O. Lemay, and Donald Dale Melton, deals with techniques for detecting, managing, and presenting syndication XML (feeds). In one embodiment, a Web browser automatically determines that a Web site is publishing feeds and notifies the user, who can then access the feed easily. A range of different embodiments are described that broaden the potential for the underlying technology to be applied in a wider range of network applications.

These are just a few examples of Jobs’ contributions. For those who are interested in a more comprehensive list, you can find one at: http://www.nytimes.com/interactive/2011/08/24/technology/steve-jobs-patents.html. (Courtesy of The New York Times.)

**USER INTERFACES FOR DEVICES**

While Jobs started his career as a technical visionary working on computer systems, it was the iPod that characterized his return to Apple. The iPod line came from Apple’s digital hub category, as part of the company’s strategy to create software for the growing market of personal digital devices. In the early 2000s, digital cameras, camcorders, and organizers had well-established mainstream markets, but digital music players were “big and clunky or small and useless” with user interfaces that were “unbelievably awful”[1], so Apple decided to develop its own. The “Walkman of the twenty-first century”[2] was developed in less than one year and unveiled on 23 October 2001.

A key product such as the iPod required some patent support to prevent others from copying the product. While Apple had a history of protecting all of its designs, in this case, the workflow and user interface were very important and key aspects, particularly as Apple had a strategy to establish itself in this industry niche. Thus, several patent families grew up around the iPod.

U.S. Patent 7,345,671: “Method and apparatus for use of rotational user inputs,” to Jeffrey L. Robbin, Steve Jobs, and Philip W. Schiller, was filed with priority from October 2001 and describes improved approaches for users of computing devices to interact with graphical user interfaces. In one embodiment, a rotational user action at a user input device is transformed into linear action with respect to a graphical user interface. In another aspect, a portion of an extended list of items is displayed and, through rotational user actions, the portion of the list being displayed can be varied with welcomed ease of use. Yes, this is the rotational UI of the iPod as shown in Figure 7(a).

Another key iPod patent is related to the iPod nano, a device that introduced the shuffle mode that randomly plays tracks from your music collection. It is interesting to take a look at the main claims for this simple UI:

A portable media player, comprising:

- a nonvolatile memory for storing a plurality of digital media assets
- a multiposition switch configured to switch positions between at least: 1) an off position, 2) a continuous playback mode position for media playback in a continuous media playback mode, and 3) a shuffle playback mode position for media playback in a shuffle media playback mode
- a controller operatively connected to the memory, the controller operable in a media mode and a data mode, wherein in the media mode the controller is operable to:
  - control playback of the media assets, in response to received user input, so that
  - 1) the media assets are to be played back in the continuous media playback mode when the multiposition switch is in the continuous playback mode position
  - 2) the media assets are to be played back in the shuffle media playback mode when the multiposition switch is in the shuffle playback mode position

You will notice that this is a much longer set of claims than the set we presented earlier. Nevertheless, it is quite powerful as it is directed to the multiposition switch of the media player. In essence, it would be very difficult to build a low-cost music player similar to the iPod shuffle without providing such a switch and thus infringing on this patent. It is also very straightforward to demonstrate infringement when the patent claims are directed primarily at external physical elements of a device, as they are in this instance.

Granted, there are some less tangible concepts here, such as the operation of the device in media and data modes. However, even these should be clearly demonstrated given the descriptions provided in the main specification.

Two other aspects of the iPod UI that were the subject of other patent claim sets are shown in Figures 7(c) and (d). The example shown in Figure 7(c) is from U.S. Patent 7,860,536: “Telephone interface for a portable communication
device;” filed in January 2006. This patent is in fact the first indication that Jobs was thinking about developing a portable device with phone functionality. As we now know, the iPhone was already on the drawing board at Apple and

The claim set for this use of the circular iPod UI is sufficiently generic to cover both old-style phone dialing and more modern texting, viz:

- at a portable communication device having a display and a click wheel
- detecting a first input on the click wheel
- in response to detecting the first input
  - displaying a telephone user interface on the display, including a current image of a rotary dial, wherein the current image of the rotary dial provides visual clues as to the functionality of the click wheel for a current mode of operation
- entering a first mode of operation, wherein, in the first mode of operation, the current image of the rotary dial is a first image of the rotary dial including a plurality of icons arranged proximate to a periphery of the rotary dial, the plurality of icons include numbers, and there is an absolute angular relationship between respective contact points on the click wheel and corresponding icon positions on the first image of the rotary dial
- detecting a second input on the click wheel
- in response to the second input, entering a second mode of operation distinct from the first mode of operation, wherein, in the second mode of operation, the current image of the rotary dial is a second image of the rotary dial including a different shading pattern than the first image of the rotary dial.

**JOBS THE INVENTOR—THE IPHONE PATENT**

We have seen that since his return to Apple, Jobs had begun to file more utility patents and, in fact, this process culminated in a master work sometimes referred to as “The Steve Jobs Patent.” More accurately, it is the main iPhone patent, but the implication is that it represents the pinnacle of Jobs’ vision for a portable, user-friendly communications device that would completely disrupt the telecommunications industry.

**FORWARD TO THE PAST**

Remember that at this time, in the first decade of the 21st century, Blackberry Corporation was the market leader in mobile communications, and its devices presented a user interface that was built around a text-based LCD and physical buttons. They also offered little by way of Web connectivity, with the main device focus being on e-mail and SMS. This new device proposed by Jobs and his team of designers and engineers was to be a genuine new beginning in handheld devices, featuring functionality optimized for a range of mobile messaging technologies combined with a user-friendly touch-screen UI, global positioning system location services, functional Web browsing, a built-in camera, and full mobile phone functionality.

The approach to IP was equally comprehensive and nonstandard. Most companies would have filed at least a handful of complimentary patents, each covering different aspects and functions of the device. After all, it packed in almost every known mobile device technology of the day, integrating these into elegant, robust, and beautifully implemented workflows. But Jobs, ever the contrarian, decided to file a single patent for the iPhone that would describe all aspects of the device as he and his team envisaged them. This was U.S. Patent 7,479,949: “Touch screen device, method, and graphical user interface for determining commands by applying heuristics,” filed 11 April 2008 with original priority from September 2006.

This famous U.S. Patent 7,479,949 is 360 pages long with more than 290 drawings. It describes in great detail the components and functionality of this portable multimedia device. Figure 8(a) shows the top-level systems and main functions of the device.

In U.S. Patent 7,479,949, Jobs is one of 25 coinventors, so he did not do all of the work, but his influence is clear. As in his earlier patents, there is a strong emphasis on design elements of the user interface. Figure 8(b) is the drawing that illustrates the main invention in U.S. Patent 7,479,949 (Figure 39C in the original patent document) and it illustrates modes of determining different gestures from a sequence of touch events and traces on the touch screen. A step-by-step explanation of the various workflows described by this figure can be found in columns 63–67 of the original patent document.

**BACK TO THE FUTURE**

Figure 8(c) shows the main iPhone screen with a docklike location of the most frequently used apps appearing at the bottom of the screen. Figure 8(d) shows the iPhone text messaging system with its characteristic text balloons, and Figure 8(e) shows the basic operation of the iOS virtual keyboard found in the iPhone and the latest generation of iPod and iPad devices.

Finally, Figure 8(f) shows the camera roll of the iPhone, which exposes thumbnails of acquired images to the user. Note that we can only show a small number of figures and drawings from the ‘949 patent in this short article, but you can gain an understanding that the full document is, essentially, a detailed overview of all functionality and features of the original iPhone.

Interestingly, for such a lengthy and comprehensive specification document, it only has a total of 20 claims, although I am pretty sure that Apple will be filing continuations on this specification for the foreseeable future.

For those who are interested, this is the main independent claim:

- A computing device, comprising:
  - a touch screen display
  - one or more processors
  - memory
instructions for detecting one or more finger contacts with the touch screen display

instructions for applying one or more heuristics to the one or more finger contacts to determine a command for the device

instructions for processing the command

wherein the one or more heuristics comprise:

- a vertical screen-scrolling heuristic for determining that the one or more finger contacts correspond to a one-dimensional vertical screen scrolling command rather than a two-dimensional screen translation command based on an angle of initial movement of a finger contact with respect to the touch screen display

- a two-dimensional (2-D) screen translation heuristic for determining that the one or more finger contacts correspond to the 2-D screen translation command rather than the one-dimensional (1-D) vertical screen scrolling command based on the angle of initial movement of the finger contact with respect to the touch screen display

- a next item heuristic for determining that the one or more finger contacts correspond to a command to transition from displaying a respective item in a set of items to displaying a next item in the set of items.

You will notice that the key invention here is the application of multiple heuristics to differentiate between different touch gestures. Specifically, these are a 1-D scrolling heuristic, a 2-D translational heuristic, and a third display transition heuristic. If you think about it, this structuring of the touch response is a key feature that is essential in most of today's touch-based devices.

**REFLECTIONS AND CONCLUDING THOUGHTS**

Now what can we learn from this review? Well, we have seen that design was at least as important as fundamental invention to Jobs, and the success of his company suggests that design is indeed almost as important as function for commercial success in the world of consumer electronics. Here we have met for the first time the legal instrument to support this—the design patent.

It is also evident that there is a certain progression in the various utility patents presented here. These gradually develop a number of underlying themes: critical UI elements, the physical embodiment of the interface with the user, and the integration of form and function within the device. These themes reach their ultimate expression in U.S. Patent 7,479,949, which is a model for other inventors to review and consider in the context of their own CE products and system designs.

Thus, not only is unified design important but there should also be an underlying vision for your product, device, or system. That vision might require years, if not decades, of time to develop and mature. But eventually, the goal should be to reach a point of final evolution, yielding a unified expression of form and function akin to that described by U.S. Patent 7,479,949. This is where you will find a strong set of legal claims and also determine what really lies at the heart of your product, system, or service.

**ACKNOWLEDGMENTS**

We have taken quite a heady trip through the IP world of Steve Jobs, but we have really only just scratched the surface. For a detailed and categorized list of all IP from Jobs, you can check out an online article from *The New York Times*: http://www.nytimes.com/interactive/2011/08/24/technology/steve-jobs-patents.html.

You can also access the original documents for each of the patents discussed in this article from the U.S. Patent Office Web site or a range of third-party Web sites (my preference is for Google Patents at: https://patents.google.com).

**REFERENCES**


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