Can You Patent an LED Flashlight?

By Henry Schneiker
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If you do a quick patent search, you will discover that at least 6 patents have been issued for LED flashlights in the past few years. And, of course, the holders of those patents probably have expectations of licensing those patents. The question is, are those patents valid? Is it really possible to patent an LED flashlight? Not really.

For a patent to be valid, an idea must be both new and not obvious to someone skilled in the art. Any patent can be invalidated by showing prior art or that the idea is obvious to someone skilled in the art.

Flashlights have been around for a long time and come in a vast array of styles and configurations. A flashlight is basically a battery, a switch and a light source packaged together in a portable form – either as a single unit or with the light and battery separated by a cord. Mounting the light on your head allows for hands-free use and is referred to as a headlamp.

The manufacturer of a flashlight does not care what technology is used to generate light. Any light generating technology is a candidate including incandescent bulbs, arc lights, plasma lights, film emission devices or solid state LEDs. What device will be used is ultimately decided by practical considerations such as cost, weight, space, heat, amount of light, beam pattern, efficiency, ruggedness, reliability and safety. Using a newly available technology is obvious to someone skilled in the art – especially when the creator of that new technology advertises the new light source for that very purpose. Or, if you wish, the advertisement constitutes prior art. HP (Hewlett-Packard) was giving away LED flashlights to engineers back in the early 1990's when they came to market with the first true high brightness amber LEDs.

An LED flashlight has all the standard flashlight parts: a battery, a switch and a light source. Since the basic idea of a flashlight is not new, that leaves the LED light source. LEDs have been around since they were first demonstrated in 1947. Once they became practical in the ’60s, it became obvious to people familiar with them that if you could make them efficient enough and wire enough of them together you could make a light bright enough to be useful. It was also obvious that once other colors became available, you could mix them together to get white or any other color you wanted.

I can remember the articles in Popular Science about the flat screen TV sets built with large arrays of red, blue and green LEDs – that was over 25 years ago and blue LEDs were not even possible back then. I remember sitting around one evening with friends doing a design for LED stage lighting – that was in 1975. And the thought of an unbreakable flashlight built from LEDs was also considered – cavers are always looking for indestructible lighting. The problem was that these designs were done before practical LEDs were available – so they had to wait. The ideas were obvious to someone skilled in the art. Those early designs constitute prior art.

LEDs are made from solid-state materials and have a very steep voltage-current curve. They have always required some form of power regulation. The simplest power regulator is a series resistor. The HP-35 calculator from the early ’70s used a simple PWM scheme to regulate power to the LEDs – clearly visible by moving the display rapidly from side to side. They also used PWM to get better efficiency out of the early red LEDs - something no longer required with modern LEDs. Motorola used PWM solely to regulate LED brightness in their cell phones in the late 1980's.

There are zillions of power regulation circuits to choose from. They come in vacuum tube, transistor and integrated circuit form. The basic principles were discovered back in the days of vacuum tubes and have been updated to work with the latest technology. The simplest

regulation circuit is a series resistor. At the other end of the spectrum are complex regulation circuits that include PWM, buck, boost, charge pumps of various configurations, just to name a few. Regulation being some combination of voltage, current or power regulation. At one time you built regulated power supply circuits with discrete parts. Now you buy single chips that do the same thing. Or even use microprocessors with specialized software. All of these methods are obvious to someone skilled in the art. And the schoolbooks, technical journals and company marketing literature are full of prior art.

The use of LEDs in the caving community dates back to the later 1980s when a caver was selling red LED flashlights. While they made excellent survey beacons, they were not pleasant to cave with - red was certainly not an optimum cave color. Later in the early 1990s when HP came out with their truly bright amber LED, several members of the caving community, including myself, immediately set about designing and building flashlights for them – regulation circuits and all. The HP amber LEDs produced a more pleasing light when compared to the red. Finally, when Nichia came out with their white LEDs in 1997, it was clear LEDs had come of age. Again, the use of LEDs and the regulation circuits needed to control them were obvious to those skilled in the art. Which circuit to use was a practical engineering design trade-off.

The bottom line is that the issued patents that I have looked at are invalid. There is plenty of prior art. The ideas are not new. And the ideas were obvious to those skilled in the art at the time the patents were applied for.

A short list of prior art includes the following:

- Wayne Yamaguchi, from private lab notebook, page 26, showing a boost converter built around a Max778 (January 1994) and associated photographs of the implementation (later 1994)

- Peter Ludwig, thoughts about a perfect cave headlamp using regulated LEDs, State of the Art Main Caving Lamps, Cave Radio and Electronics Group (Creg Journal), 1997.

- Don Lancaster, publication of technical column in national publication providing full technical details about the upcoming Action Light (Muse124, May 1998).

- HDS Systems, Inc., technical paper presentation (January 1998), circuit board design, assembly and demonstration of working production prototypes of regulated LED light (October through December 1998), additional technical paper presentation (January 1999) manufacture and sales of Action Light products (March 1999).

Need I say more? These references cover single and multi-LED configurations, single and multi-battery configurations, regulation by resistor, PWM and fancy buck and boost converters. Other references, such as NiteRider can be used to cover microcontrollers and intelligent functions.