Dozens of recent patents have been awarded for devices that invoke principles outside accepted science, such as exotic nuclear physics and psychic forces

'New Physics' Finds a Haven At the Patent Office

A famous cartoon shows a man waiting outside the Patent Office with a complicated gadget in his lap. He looks over and sees another man holding exactly the same contraption. The image reflects a common myth—that the government checks that an invention relies on accepted principles before granting a patent. But consider two recent patents: 5,616,219 and 5,628,886, issued to Clean Energy Technologies Inc. of Sarasota, Florida, for an electrochemical device that is claimed to put out more energy than is possible by chemistry alone. Or take Clean Energy's patent 5,672,259, for a process to transmute radioactive elements by electrochemistry. Physicists who have examined these patents say the claims resemble cold fusion; the company rejects that label but says its products do exploit "new nuclear physics." Either way, the devices would challenge some basic notions of modern physics if they worked as advertised. A cursory search of recent patents reveals dozens of others like them.

Selling points. A company developing "revolutionary" energy technology lists its patents.

Such patents confer prestige and legitimacy, attracting investment dollars and customers. "Having a patented device, with lots of fancy equations in the manual, that's partly why people take it seriously," says Keith Conover, a University of Pittsburgh physician who has studied a patented instrument said to be able to find buried disaster victims by "dielectrokinesis." Patents like those awarded to Clean Energies have also helped keep the cold-fusion field alive. Roundly scorned by the scientific establishment in the 10 years since Stanley Pons and Martin Fleischmann first said they had achieved fusion in a jar, claims of unlimited energy live on—albeit under other names—in the patent literature.

Most disturbing to some onlookers is the window such patents offer on the patent examination process. The U.S. Patent and Trademark Office (USPTO) is now staggering under an onslaught of patent applications. Its nearly 3000 examiners must process roughly 240,000 intellectual property claims every year, a number that is increasing by more than 8% annually because of increases in software and biotech applications. Says one former USPTO employee, "They are desperate and they're hiring like crazy." The office plans to add another 700 examiners in the coming year. And as Richard Maulsby, a PTO spokesperson, admits, "It is very difficult for us to do all this hiring and to maintain quality." The result, in some cases, is inspectors who have little experience—or are themselves devotees of fringe technology (see sidebar on p. 1254).

The Patent Office has long been besieged by inventors seeking patents on weird gadgets, and patent law is specifically written to restrict patents on one kind of device with perennial appeal, perpetual motion machines. Anyone who wants to patent such a mechanism has to submit a working model as part of his application. For most inventions, however, the bar is lower. Except for perpetual motion machines, "the Patent Office hasn't required a working model since the 19th century," says patent attorney Michael J. Colitz, the creator of the Wacky Patent of the Month Web page. Instead, patent law requires only that an invention be novel, nonobvious, and reducible to practice.

"Reducible to practice" sounds like "really works," but by clever wording, patent applicants can dodge tough scrutiny of how realistic an invention is. The trick is to avoid the perpetual motion label and others, such as "cold fusion," that might raise red flags for the patent examiner who searches prior patents and judges whether a patent claim makes sense. "Each patent examiner has different criteria," says Colitz.

And these days, sincere but poorly trained examiners are making many of those judgments, says patent consultant Greg Aharonian, editor of *Internet Patent News*. One examiner says he was interviewed over the phone by a supervisor. A few days later he got a package in the mail. "I thought it was an application," says the interviewee. "But it was a form confirming my acceptance of the position." The low salaries at the Patent Office don't help matters, say patent examiners and outsiders. "They have a variety of problems in not being able to retain good patent examiners because of the high salaries outside," says Aharonian. "You really have to be a patriot to want to work at the Patent Office."

Cold fusion reheated?

Inexperienced patent examiners may be one reason why some unlikely inventions—helped along by clever patent attorneys—have recently won patents. Although the Patent Office initially rejected cold-fusion patents after Pons and Fleischmann's memorable Salt Lake City press conference in 1989, some experts say the Clean Energy patents show that such patents are now slipping into the books. James Reding, Clean Energy's chief executive officer (CEO), insists that his company's technology is not "cold fusion," although he says it does exploit nuclear processes. But every physicist *Science* has asked about the Clean Energy patents, including IBM's Richard Garwin and William Happer of Princeton University, says they describe what are essentially cold-fusion devices. And the March/April 1999 issue of *Infinite Energy* magazine, a publication for cold-fusion buffs, includes Clean Energy work in its list of "Key Experiments that Substantiate Cold Fusion Phenomena."

The patents say that the devices generate excess heat by passing a current through a cell containing beads coated with a metal such as palladium and exposed to various hydrogen isotopes—the same setting where cold fusion was said to occur. Garwin and others say the devices are unlikely to prove viable, either as energy sources or as systems for rendering radioactive waste harmless. Conditions in an electrochemical cell fall far short of what is needed to trigger nuclear reactions, they note. "The cell has never produced any excess heat, in my judgment," says Garwin, who has looked at Clean Energy's data. "And this remediation of radioactive materials is incredible and has not been demonstrated." Reding responds that he knows the physics is controversial, but "the technology is very real."

Reding says that the company's first attempts to patent the devices failed because the applications went through the group of patent examiners who specialize in nuclear science. But he says that by carefully structuring another application, the company was able to steer the patent to a different group of examiners, who handle electrochemistry. "Our patent attorney was very helpful in this process," says Reding. Attempts to reach the examiners who approved the patents have been unsuccessful.

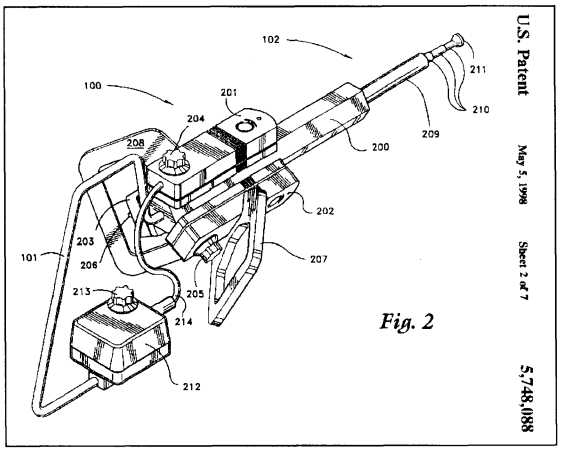
A check of the USPTO Web site (www.uspto.gov) also reveals other odd devices. Patent 5,830,064, for example, was granted to a company called Pear Inc. for an electronic gizmo that is meant to detect the skewing of a random signal caused by psychic forces. Pear Inc. is associated with PEAR, the Princeton Engineering Anomalies Research laboratory, which is run by Robert Jahn and Brenda Dunne, longtime parapsychology researchers who are named in the patent as co-inventors. According to the patent, the device could be used to detect the "volitional state of one or more persons" and could control games, computer displays, and appliances.

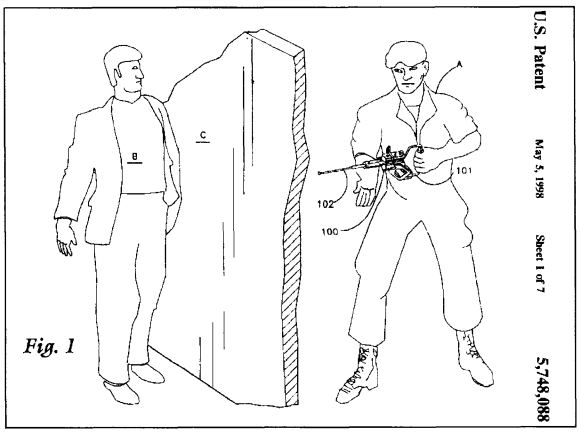
Pear Inc. has been renamed Mindsong Inc., and its Web page (www.mindsonginc.com) carries a press release about the patent, calling it the first patent for "devices responsive to intention of operators physically isolated from the device." Mindsong offers a product based on this "patented technology" that is claimed to control electrical devices plugged into ac outlets on the box, for $425.00 plus shipping and postage.

At first glance, says physicist Marc Sher of the College of William and Mary in Williamsburg, Virginia, the patent seems to describe conventional technology—a circuit that generates a random signal and other electronics for detecting anomalies. "You look at the title and the abstract and it looks okay," Sher says. "Then you look at the background information and the rest of it, and it goes off into ga-ga land." If this kind of psychic control worked, Sher notes, it would be the "biggest thing since Galileo. But it has never been confirmed."

Mindsong CEO John Haaland has an answer for the skeptics: "Well, they should buy it and try it." Haaland, a former vice president of the Pillsbury food company who has a Ph.D. in biophysics from the University of Minnesota, feels that the critics have not done their homework. "They should dig harder," he says. Haaland believes the forces at work are based on the "quantum coherence of living systems," which skeptics do not understand, he says. What's not in doubt is the value of the patent to his company. "It's a very important piece of our portfolio," he says. "We've been talking to investors, and the patent is a key part of our market strategy." Haaland says the company has sold 32 of his devices so far.

The examiner for that patent, George Manuel, explained in a telephone conversation that he normally works on medical devices, but because of the backlog he was temporarily assigned to work on patents for games and toys, which is how the Pear patent is classified. Manuel said he didn't find anything outrageous about the patent. "I feel comfortable that this one was issued," he said. "I assume that what is put forth is legitimate."





Telltale heart? Drawings from a patent that describes a device for finding intruders and disaster victims by picking up the heart's electric and magnetic fields.

CREDITS: USPTO/WWW.USPTO.GOV

Trust or verify

Then there is patent 5,748,088, granted for a device to locate "entities" by "dielectrokinesis." A product based on this patent is the LifeGuard system sold by DKL Inc. for the purpose of locating humans behind barriers. DKL says the LifeGuard can detect the electric and magnetic fields produced by a human heart at distances of up to 600 meters by means of a probe attached to a swivel mount. The LifeGuard products are currently being marketed for about $8000 each (operator training is extra) to law enforcement agencies and search-and-rescue teams for detecting intruders and locating disaster victims. DKL declined to release sales figures but said that "hundreds" of units are in use.

A group at Sandia National Laboratory in Albuquerque, New Mexico, however, concluded last year that the device is ineffective, based on double-blind performance tests as well as a "teardown" and physical analysis done at the request of the National Institute of Justice.* The Sandia group also examined DKL's scientific claims. According to a company brochure, the LifeGuard's probe swivels to point to a distant human body because of "dielectrophoresis," a term coined by University of Oklahoma physicist Herbert Pohl in the 1960s for the tendency of uncharged, highly polarizable materials to point toward the strongest part of a nonuniform electric field.

As most scientists understand it, however, dielectrophoresis is a weak effect seen only in powerful electric fields. When the Sandia group ran calculations using Pohl's own equations, they concluded that "there is no possibility that the DEP [dielectrophoresis] effect is responsible for the rotation of the antenna assembly." The executive summary of the physical analysis further concludes that the LifeGuard is not based on "dielectrophoresis or any other scientific principles as understood by the scientific and engineering community."

Conover, who is a 30-year veteran of search-and-rescue operations, says the Life-

* Sandia's physical analysis is available at nlectc.org/services/dklanalysis.html; the performance tests can be seen at www.prod.sandia.gov/cgi-bin/techlib/access-control.pl/1998/980977.pdf

A Free Energy Enthusiast Seeks Like-Minded Colleagues

One patent examiner is working to make the Patent Office more hospitable to fringe energy technologies, including cold fusion: Thomas Valone. Valone, who has worked for 4 years as a patent examiner and has a master's degree in physics, is also president of a Washington, D.C.–based outfit called the Integrity Research Institute (IRI), which advertises books and videos on antigravity, mind control, and unconventional energy sources on its Web site. In an e-mail message broadcast last year on Internet news groups dealing with fringe science, Valone called for "all able-bodied free energy technologists" to "infiltrate" the Patent Office. Valone also secured government sponsorship—it was later withdrawn—for an IRI-organized conference on cold fusion, tabletop nuclear transmutation, and various other unusual energy proposals.

Valone's e-mail message offered to accept résumés at his offices at IRI and to forward applications to the appropriate supervisor at the Patent Office. Valone says he is simply trying to spread the word about free energy devices, which he feels are misunderstood. And he was briefly successful in recruiting a kindred spirit, Paul LaViolette, who was hired last year and resigned from the Patent Office on 9 April. According to the October 1998 issue of the *Unofficial Gazette*, a newsletter of the Patent Office employees' professional society, LaViolette's interests include assertions that antigravity technology was incorporated into the design of the B2 bomber and that the Sphinx is a 16,000-year-old cosmological cryptogram.

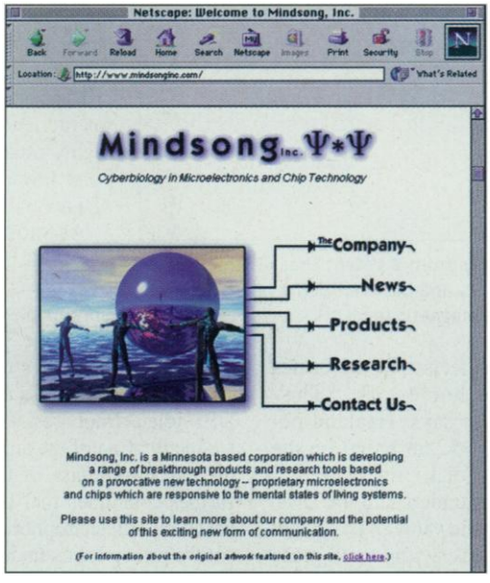
LaViolette confirms that Valone helped recruit him and says the *Unofficial Gazette*'s portrait of his interests is accurate. He did not issue any patents during his short tenure, and those issued by Valone appear to be for conventional terrestrial technology. But conventional science was not the focus of the IRI's First International Conference on Free Energy. IRI persuaded the State Department last year to include its conference in the department's Open Forum program, a prestigious venue for discussions of issues in foreign policy, then promptly sent out notices in official government envelopes.

After Bob Park of the American Physical Society wrote about the meeting in his tart e-mail newsletter, *What's New*, the red-faced State Department insisted on having the papers peer reviewed. None of the dozen or so talks passed muster. "The papers ranged from the mediocre to the truly weird," says a physicist at the State Department who was involved in carrying out the peer review. "Not one of them showed any understanding of modern science." As a result, the State Department did not host the Conference on Free Energy.

But the conference was not canceled. At first, Valone moved the meeting to the Department of Commerce, where as a department employee he was able to reserve an auditorium. The meeting title was changed to the Conference on Future Energy, still hosted by IRI but advertised as being "under the auspices" of the Commerce Department. When Commerce senior staff learned of the conference, permission for use of the auditorium was withdrawn. The meeting took place at the end of April at a hotel in Bethesda, Maryland. **–D.V.**

Guard is essentially a fancy dowsing rod. "It is clearly based on magical thinking and not scientific thinking." He says many search-and-rescue teams are financially strapped. "This expense could wipe out some units," he complains, "and it takes resources away from proven methods."

DKL President Howard Sidman says the company stands by the product and that the critics do not understand the device. "The [Sandia] report is rubbish," says DKL chief engineer Bob VanDine. Spokesperson Nancy Wolcott says that the performance testing did not follow the operator's manual, although both the Sandia report and DKL say that one of DKL's employees was the operator for the test. DKL claims that its own analysis of the Sandia data and testing by other labs hired by the company show that the product is reliable. Further, says DKL, testing by a security company in Belgium and a crime-prevention group in Los Angeles gave 100% success rates. Wolcott claims that Sandia has a conflict of interest because the lab is trying to sell its own sensor technology.



Read my thoughts. Home page of a company that has patented a device it says can respond to psychic forces.

CREDIT: MINDSONG; ILLUSTRATION: DAN HANSON/CREATIVE FRONTIERS

The examiner who handled this patent, Nina Tong, said that her job is to check and see if the claims are covered by previous patents. "I tried to look up 'dielectrokinesis,' but I couldn't find it," she says. "I trusted them that it works as they claimed, and I assumed that people skilled in the art would use this word all the time." Tong is an assistant examiner with a couple of years' experience at the PTO and a bachelor's degree in electrical engineering. The primary examiner who signed off on the patent, Thomas Mullen, said that he typically gives the application only a quick look to make sure all the parts are filled out.

Aharonian says that the problem goes beyond inexperienced patent examiners to the pressure to process paper for what USPTO calls its "customers"—the patent applicants—which leaves little room for quality control. "The big betrayal at USPTO," says Aharonian, "is that they forget they have two customers: the applicants, and the American people on whose behalf the applicants are granted monopoly rights." One examiner, who requested anonymity, says that priorities have shifted at the Patent Office. "When I started several years ago, we were told 'When in doubt, reject.' But now, it's 'When in doubt, issue the patent.'"

Nicholas Godici, the deputy assistant commissioner for patents, refused to comment on any specific patent and denied that examiners were being hired over the phone. He added that he was satisfied with the patent examination process. Moreover, he said, the USPTO doesn't check inventions to see that they work. "We assume the information provided in an application is accurate. We don't have lab facilities or do testing, but we may ask for additional data from the inventor," he said.

Godici concedes that the public views patents as a stamp of approval but says that's a misunderstanding. Patents are nothing more than "a legal right to exclude others from using or profiting from an invention." Yet Clean Energy's Reding says they carry an additional cachet. "We've raised $5 million from investors," he says. "The fact that the U.S. Patent Office has declared your invention novel and unique is clearly valuable." **–DAVID VOSS**