



fig.1



fig.2



fig.5

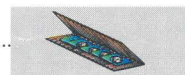


fig.4

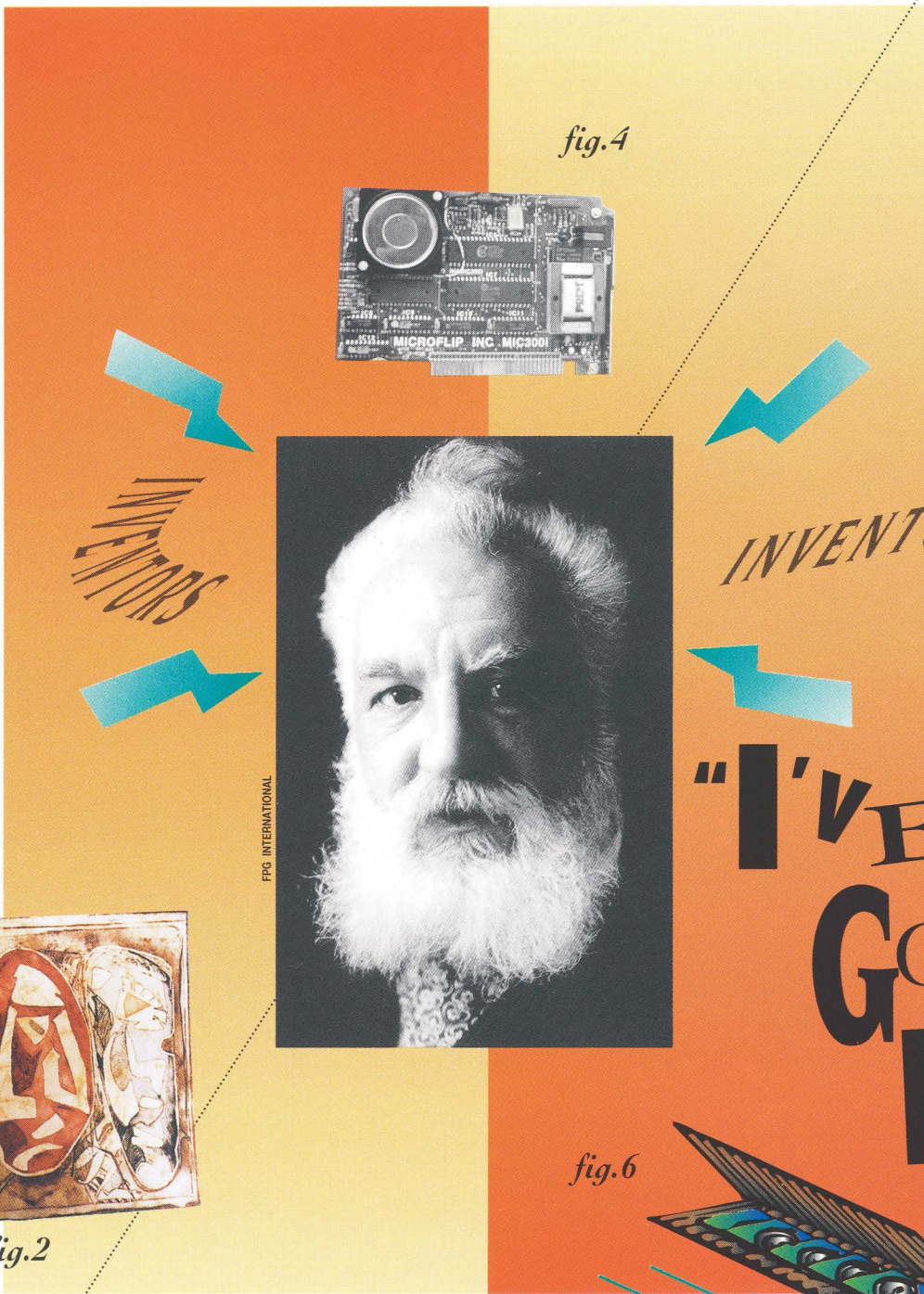


fig.4

INVENTORS

INVENTORS

"I'VE GOT IT..."

FPG INTERNATIONAL



fig.2

fig.6

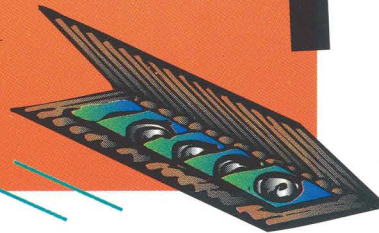


fig.1



fig.2

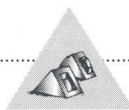


fig.5

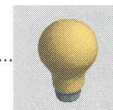


fig.4

FEATURE

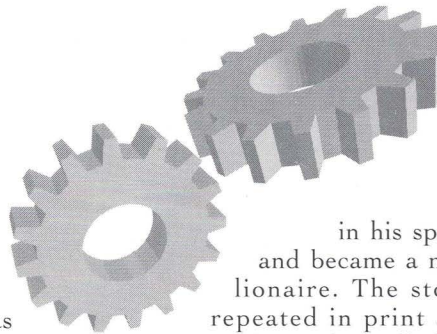
Inventing requires the mind of a maverick and the persistence of pain.

By Doug Garr

I remember precisely when the soaring romantic ideal I long harbored about inventors and inventions was abruptly shattered.

It happened about 12 years ago when I found myself in California's Silicon Valley researching a magazine piece. The subject was Steve Wozniak, who once amused himself by building electronic boxes that deciphered Ma Bell's switching system to make free long-distance calls, but who is best remembered for designing the circuit board for the original Apple computer.

Anyway, the story went that he invented the Apple on a workbench in his father's garage. This was irresistibly charming, a press agent's dream; a college dropout who futzed



around in his spare time and became a multimillionaire. The story was repeated in print a dozen times until it was the stuff of legend.

Uh, but it didn't happen exactly that way, Woz explained almost apologetically. He had really filched a lot of time from Hewlett-Packard, where he'd been employed as a technician. Woz had actually built the prototype Apple in one of those drab, modern buildings and, well, they just took the historic pictures in his dad's garage.

From that day on, every time I heard a garage story about some new gizmo that made its creator a small bundle, I was skeptical about the circumstances. The fascinating tales of discovery often have the benefit of

hyperbole to make them even more fascinating. Like fish stories, they get better the more they're repeated.

Steve Wozniak never planned to be rich, and he initially felt leaving Hewlett-Packard and starting a computer company was a bad idea. But unlike Wozniak, the typical inventor is trolling for big-game fish, although most are too subdued and too dignified to admit it. They toil in solitary obscurity, secretly hoping they will build a better mousetrap and get rich.

Martin Pollak understands the inventor's heroic personality well. The 1950 graduate of Syracuse University's College of Arts and Sciences spends a good deal of his time smiling politely and saying, "No thank you." As the executive vice president of the National Patent Development Corporation, a New York City licensing firm, he and his associates look at hundreds of ideas every year, and reject almost all of them.

Pollak is painfully candid in his assessment of the inventive personality. "They are the same, basically, all over the United States, all over the world,"

or maybe I don't."



fig.1



fig.2

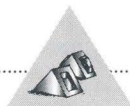


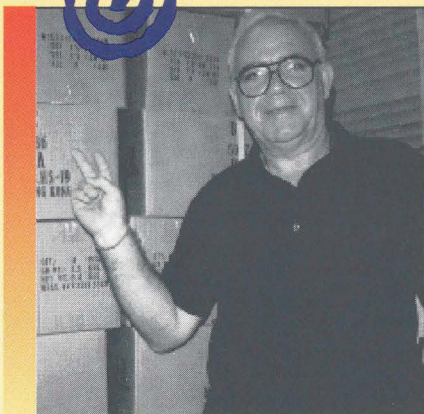
fig.3



fig.4



fig.1



HAIR BRAINED

Having a bad hair day?

Not if George Barradas has anything to do with it. He's the Thomas Edison of hair-care appliances, creating tools to curl, set, and style.

Barradas, a 1948 graduate of the College of Visual and Performing Arts industrial design program, has invented curling brushes, hair rollers, and curling setters—not to mention the first curling iron with mist—often working through companies such as Norelco, Conair, Sunbeam, and Sears.

An inventor for more than 40 years, Barradas developed hardware for pharmaceutical companies before going independent.

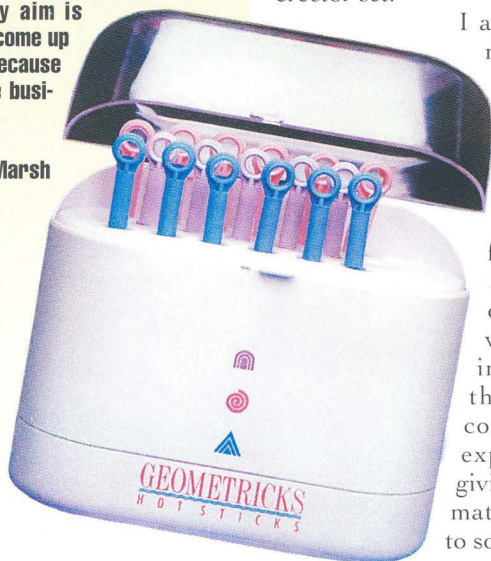
"When I went out on my own, there was one account that was in hair and small appliances," says Barradas. "I got acquainted with the industry and started coming up with various concepts.

"If you have a creative or inventive mind, and you're exposed to certain areas, your mind automatically works in those directions. Mine did."

Based in Greenwich, Connecticut, Barradas often tests his concepts and products in his son's beauty salon.

"I enjoy hair-care products and I've had a lot of experience working with them," he says. "My aim is always to improve or come up with a new concept because it's a very competitive business."

—Andrea C. Marsh



Diligence separates the intellectual heavyweights from all the lovable but screwy, geeky guys.

he says. "They're very careful and very nervous about someone stealing their ideas. Ninety-nine percent of them. I'm being gracious to the one percent.

"I can't tell you how many people come in with a new toothbrush. They all want to do everything themselves. They think they know everything. They want to write the patent, sketch the diagrams, do the legal work. They are a particular breed, but it's important that they're that way. Even when they have crackpot schemes, you have to admire their diligence, their industriousness."

One man Pollak did take seriously, however, was an eccentric Czechoslovakian professor, Otto Wichterle, who developed the process that resulted in making the material used in soft contact lenses, patented in 1968. Pollak recalls the professor fashioned the prototype lenses with a device made with erector set parts. Recalling my garage theory of overstuffed legend, I looked askance and Pollak promptly produced a photo. There was an erector set.

I asked Pollak what made him qualify Wichterle as an eccentric.

"I had dinner with him and his wife one night, and they kept furtively passing notes to each other," he said. "It was very distracting. At the end of the meal I finally confronted him. He explained they were giving each other little mathematical puzzles to solve."

Eccentricity is only one of the clichés we've embraced about inventors. There are others, not all true, and they've been perpetuated by the ghost of Thomas Edison. It is easy to buy into Edison's homily about the process of innovation being one percent inspiration, 99 percent perspiration in a white lab coat. We've been conditioned to believe imagination is only a small part of the game; diligence, we're told, is what separates the intellectual heavyweights, the patent bearers from the lovable but screwy, geeky guys, the Rube Goldbergs whose neurons temporarily misfire while they are in the shower.

"I've finally got it," they squeal, "the engine that runs without ever adding oil! The perpetual motion machine! But I can't tell you about it because Detroit is trying to suppress it!"

Patent examiner David Henn has seen this misdirected enthusiasm. Henn, who graduated from SU in 1990 with a degree in aerospace engineering, usually deals with attorneys, but his limited contact with inventors echoes Martin Pollak's thesis. The inventor is a member of an unusual species that lives in its own unusual habitat. Henn spends his workday poring over diagrams and claims, ensuring that they meet the three criteria of being novel, useful, and unobvious. And, of course, the invention has to work. A surprising number do not.

Henn recalls an inventor who brought in a "motion device" that actually did move, but didn't really do anything. Henn couldn't describe what it looked like because that would violate the Federal Privacy Act, but he did allow that it didn't fit the criterion of being useful. There was nothing he could do but turn the inventor down.

"When we reject their claims, they

get upset, sometimes even very angry," says Henn. "You know, we're all incompetent boobs."

Certainly there are thousands of legitimate, full-time, independent inventors—after all, one successfully sued an auto company that tried to appropriate his idea for the intermittent windshield wiper now used in millions of cars—but they are a dying breed, steadily falling prey to the well-financed corporate giants with literally dozens of bright predators lurking in research and development tanks. Only the surest willed can compete with the big firms that can afford to throw millions of dollars at a problem. In fact, the shrewd ones usually do not end up competing with large companies. The independent type is more likely hoping to discover a solution in search of a problem. Or, to put it another way, the simpler the idea, the easier it is to find a market, create a demand, and then sell it.

It is the sheer quirkiness of the trade that attracts us to the souls of the professional tinkerers and many amateurs as well. The Patent Office files are filled with drawings of ridiculous fare—there have been more than 5.2 million patents in the past 203 years. How many of us can name more than 50 or 100 significant improvements? The colorful history of invention also features a host of gadgets that were born out of seemingly sound logic but never found an audience. In 1849 Abraham Lincoln, while a congressman, received patent number 6,469 for A Device for Buoying Vessels Over



Shoals.

It was an idea that came to him after a Mississippi River boat he had been on ran aground. Mark Twain was an incurable dreamer who received three patents, including one in 1871 for An Improvement in Adjustable and Detachable Straps for Garments. Nothing much came of this, but he made a lot of money on his Self-Pasting Scrapbook. He invested many of his book royalties on the brainstormings of other inventors, but none panned out. Edison came up with a talking doll in 1890, but it didn't do nearly as well as Chatty Cathy or any of the other modern, synthesized versions that cry for their mommies.

New products have been conceived by necessity, almost by some *Zeitgeist* click of the metronome. The Industrial Revolution reaped the cotton gin, sewing machine, incandescent light, typewriter, telephone, and a slew of other items we take for granted but cannot live without. We remember Eli Whitney and Orville and Wilbur Wright, but being remembered isn't

PHOTOS BY DARRIN JIM BEHR



Etched by Electricity

When Marion and Omri Behr bought farmland in upstate New York, they thought their barn would make a perfect studio for Marion's etching and printmaking. Then they realized the acid used in those processes would contaminate nearby streams and springs, water sources for their property and some of the local community.

While researching the problem, the Behrs discovered just how damaging the acid could also be to Marion and other artists. They decided there had to be a safer way.

Combining her artistic background with her husband's scientific background—Omri is a patent attorney with a Ph.D. in chemistry—the Behrs invented Electroetch, a technology they believe will revolutionize the process of etching.

Traditional etching is done by coating a plate of zinc or copper with a liquid wax substance and then carving the desired image with special tools. The plate is then submerged in an acid bath and an image is etched into the plate wherever the wax has been cut away.

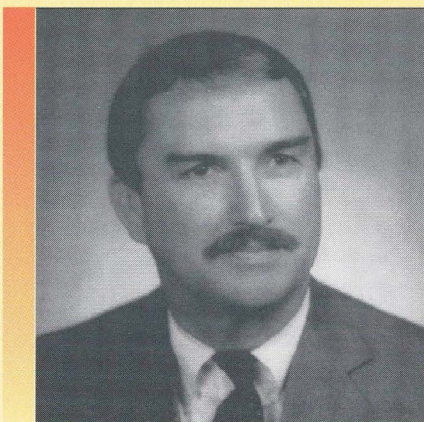
"Our system eliminates acid totally," says Marion, who received her bachelor of fine arts and master of fine arts degrees from the College of Visual and Performing Arts in 1961 and 1962, respectively. "The process is electrical as opposed to chemical."

This electrical process might also be better than traditional etching methods. With this process the artist can achieve tone, embossments, and texture, as well as metal stencil and shaped plates at a complexity not previously available.

Although the Behrs' process isn't yet available to the public, reaction to Electroetch has been positive; many master printers say the etching lines from Electroetch are more beautiful than those from the traditional process.

The Behrs recently received a grant from the Charles A. Lindbergh Fund and will spend the next year and a half perfecting Electroetch, making larger tanks available at a reasonable cost so the process may one day be widely used by printers and artists.

—Andrea C. Marsh



What's Cookin'?

It happened in a diner in the wee hours of the morning. Inspiration hit Paul Brefka as he watched the short-order cook place a heavy piece of metal on top of frying bacon.

Initially, he thought the cook was trying to flatten the bacon, but then realized he was only trying to hasten its cooking time by increasing the meat's contact with the heated surface.

"He was only doing it on one side. So I thought, what if I did it on both sides?" recalls Brefka. He created a test oven with a couple of electrical plates, added springs to the upper plate for pressure, and *voila*, invented the one-minute grill—a piece of bacon cooks in 35 seconds, a medium-rare hamburger in 45 seconds, and a medium-rare steak in 75 seconds.

The grill, which was patented in August, is just one of the many devices Brefka has created in the past 30 years.

Brefka, who graduated with a bachelor's degree in industrial design from SU in 1959, and his former associate Peter Latham, who received the same degree four years earlier, have invented the Styrofoam egg carton, the plastic milk bottle, and the first all-aluminum racquetball and tennis rackets.

They even created a panel meter on the first space shuttle and an electronic synthesizer that duplicates the sound of a concert grand piano.

These days Brefka spends much of his time tinkering in the kitchen, working on other culinary creations. In addition to his grill, he has invented an egg steamer, vegetable steamer, and pasta maker.

He's also whipping up a frozen yogurt machine and rethinking the concept of making ice in the refrigerator.

"I've directed all of my efforts toward better health, more efficiency, and being tailored to the needs of the smaller family," Brefka says of his latest ventures. Plus, he adds, "It's fun and it solves an awful lot of Christmas headaches."

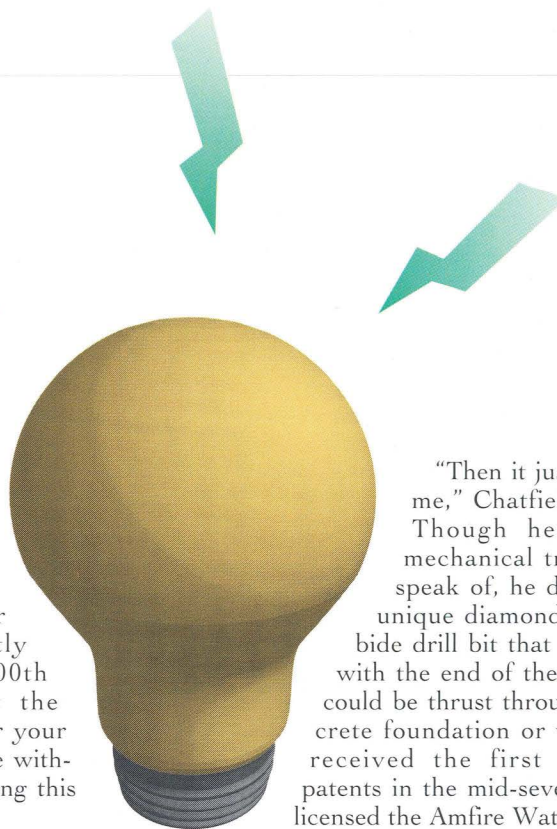
—Andrea C. Marsh

what matters. Whitcomb L. Judson's Slide Fastener, also known as the zipper, patent number 504,038, recently celebrated its 100th anniversary, yet the odds heavily favor your forgetting his name within minutes of reading this article.

Perhaps the one universal truth about the methodology of innovation is its sheer resistance to neat classification. Inventors are an eclectic bunch, their nomadic minds about the only thing they have in common. It is the nature of their work that they have no rigid schedule. They are constantly wasting time creatively, dreaming the big dream, awaiting the one brilliant bolt of lightning that will make them rich or famous.

Take the case of John Chatfield of Easton, Connecticut, whom you've never heard of and is probably anonymous to the thousands of fire fighters who depend upon his invention.

Chatfield, now 72, was a business administration student at Syracuse University, class of 1944. But he left after three and a half years when the Navy called, never earning a degree. After the war, he sold real estate and insurance. He became a member of a volunteer fire company and one night answered a call and watched a building burn in record time. The crew couldn't get into the building because the fire was too hot. Chatfield got back to the station at 2:30 a.m. and couldn't sleep. He kept thinking there had to be a better way.

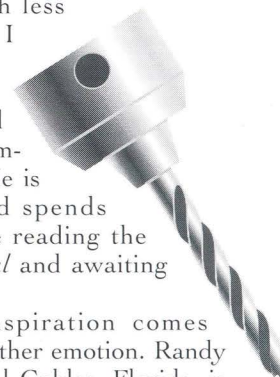


"Then it just came to me," Chatfield recalls. Though he had no mechanical training to speak of, he designed a unique diamond and carbide drill bit that combined with the end of the hose and could be thrust through a concrete foundation or walls. He received the first of many patents in the mid-seventies and licensed the Amfire Water Drill to a firm that convinced many fire departments of its utility.

Even today, Chatfield is cavalier about his discovery, thinking it was so simple he couldn't believe someone hadn't thought of it earlier. Invention, he firmly believes, is a talent that you either have or you don't. His great-grandfather was an inventor, and because they are both "eccentric characters," he has this somewhat nutty notion that he has his forebear's genetic code, which simply skipped a few generations and landed in his DNA.

"Laziness is the mother of invention," he declares. "You must be lazy by nature. You have to want to do things with less effort. Frankly, I haven't been inspired lately. Nobody can tell whether I'm dreaming or loafing." He is semi-retired and spends much of his time reading the *Wall Street Journal* and awaiting the muse.

Sometimes inspiration comes cloaked in some other emotion. Randy Levenson of Coral Gables, Florida, is not an inventor by trade—he's a photographer—but a couple of years ago his anger inspired him to create a new



Inventors are an eclectic bunch, their nomadic minds about the only thing they have in common.

consumer electronics product. His three children constantly parked themselves in front of the television every afternoon when school let out, a familiar scene to families everywhere. Efforts to cajole the kids to the library or the playground failed.

"I got so mad, I had to do something," he said. So Levenson designed a device that rations the number of hours a week each child can watch the tube. Parents preset the limits and the kids punch in their passwords to access *The Simpsons*.

Levenson received a patent for the proprietary software for TV Allowance, and he's manufacturing and marketing the product. He has put in many hours peddling it to investors and the public. But he has a long way to go before he begins to recoup the thousands of dollars he has invested in TV Allowance's development. Though he hopes to make money, he's realistic. He's not sure American households are ready for another \$99 black box atop their TV sets. "But it works in my house, and if peace and quiet are all I ever get, then it was still worth it," Levenson says.

Levenson's voice is one of reason; he began on a lark and took a very reasonable long shot. He is not unlike the many professional, full-time independent inventors, who, deep in their hearts, know the unwritten rules of the game. They know romance is a deceptive lure. They must spend a good deal of money—often several thousand dollars—for patent protection (usually hiring an attorney to guide them through the average time between application and approval, typically 19 months), giving them the exclusive rights to sell their invention in the United States for 17 years.

But once they have a patent, hard

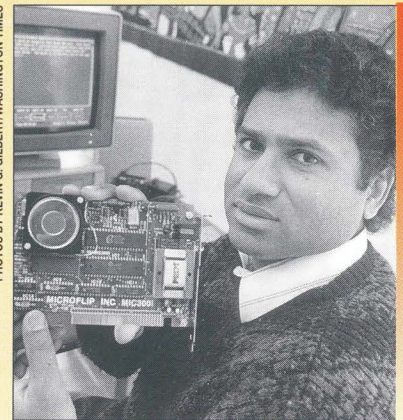
work remains. They must tackle the rut-strewn path to the marketplace or license their claim to a company with expertise. There is a long journey between the idea and the payoff. Good inventors obtain dozens of patents, but only a handful of their ideas ever turn into products, and of those, perhaps one or two become real money-makers.

That's the reason why today the great majority of the patents are awarded to engineers and scientists grinding out small advances at places like Kodak, General Electric, Panasonic, and Sony. The geographic domain of patent origination reveals much about the rote institutional personality of invention nowadays.

The dominance of Yankee ingenuity, once a comfortable and reassuring bromide, is slowly dissolving. Slowly, because although we didn't yet know it, foreigners began their assault in 1900, when a Japanese official in Washington, D.C., said, "We have looked about us to see what nations are the greatest, so that we can be like them. We said, 'What is it that makes the United States such a great nation?' and we investigated and found that it was patents, and we will have patents."

Of the record 109,728 U.S. patents awarded in fiscal 1992, about 55 percent were issued to Americans and 45 percent to foreigners. Japan led the foreign nations, with Germany and France second and third, respectively.

PHOTOS BY KEVIN G. GILBERT/WASHINGTON TIMES



Phone Home

For the 20,000 people in this country with serious hearing problems, the telephone has never been much of an asset. Thanks to Dillip Emmanuel, that may be changing.

Frustrated by the poor telephone services available to the deaf and hearing impaired, Emmanuel spent eight years creating a computer modem that allows people with Telecommunication Devices for the Deaf, or TDDs, and personal computers to quickly communicate with one another via telephone lines.

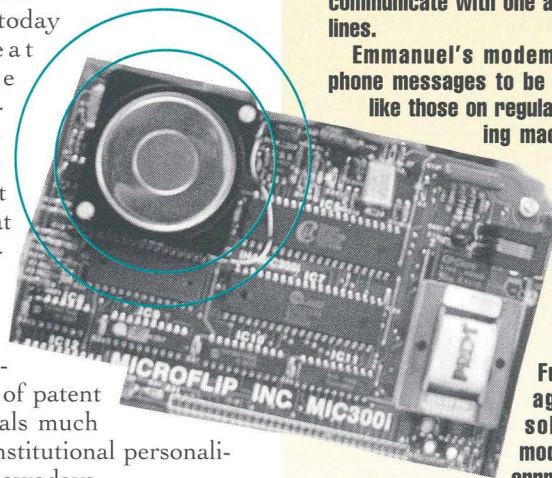
Emmanuel's modem allows computer phone messages to be received and saved like those on regular telephone answering machines, only in print form. Both sides of a conversation can be viewed on a screen and saved. And automatic dialing is available.

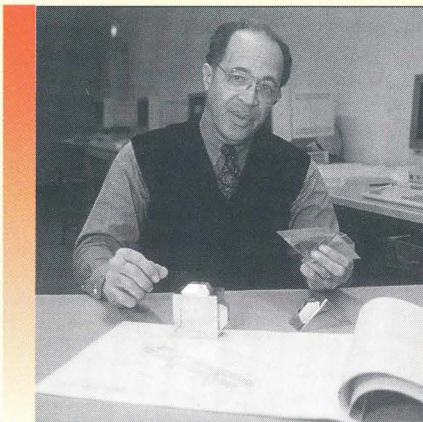
Since introducing FullTalk three years ago, Emmanuel has sold about 2,000 modems, many to government offices trying to adhere to the Americans With Disabilities Act of 1990, which demands equal access for the disabled.

The idea for FullTalk was born when Emmanuel, himself deaf, attended Syracuse University and wished to communicate with his faraway sister, also deaf. While working toward a master's degree in electrical engineering, which he received in 1982, Emmanuel built two standard modems so he and his sister could communicate using personal computers.

By 1990, Emmanuel had created FullTalk, for which Emmanuel's employer, Microflip of Glenn Dale, Maryland, received the Distinguished Manufacturer of Adaptive Technology Award from the United States Department of Commerce. Emmanuel is vice president and systems engineer at Microflip.

— Bob Hill





STEVE SARTORI

A Better Brick

Kermit Lee loves problems, particularly those he can solve. One of his latest endeavors involves building a better brick, which is now patented in 62 countries and contracted for use in Russia.

Unlike conventional concrete bricks, the brick Lee helped devise is square, not rectangular. No mortar is needed or seen because it's already inside the brick, and because the brick's joints are diagonal rather than vertical or horizontal, Lee says it can withstand more stress than a conventional brick.

"These interlocking bricks provide more user-friendly building materials, particularly in developing countries," says Lee, who graduated in 1957 from the School of Architecture, where he is now a professor. "These bricks can be installed by unskilled labor, which is ideal for developing countries. Our pitch is that a family of four can build a home in 12 hours."

Lee, who has designed nearly 300 buildings worldwide, became involved with the interlocking brick nearly three years ago, when he was approached by two inventors to fine tune their idea and its potential uses.

"It has been in the works for more than eight years," says Lee, "but it didn't come to fruition until three of us began working on it."

Lee says interlocking bricks "do everything conventional bricks do, plus a whole lot more. There are many other applications. They could be used on the levees along the Mississippi because you don't have to stop building for moisture or wetness, since you're not dealing with visible mortar."

Lee also has a patent for a home recycling system for cans and is working on an invention that attempts to eliminate smokestacks from incinerators at resource recovery plants. As for interlocking bricks, Lee hopes they are better than conventional concrete bricks for use inside homes as well: He and his associates are marketing a toy version of their bricks.

— Bob Hill

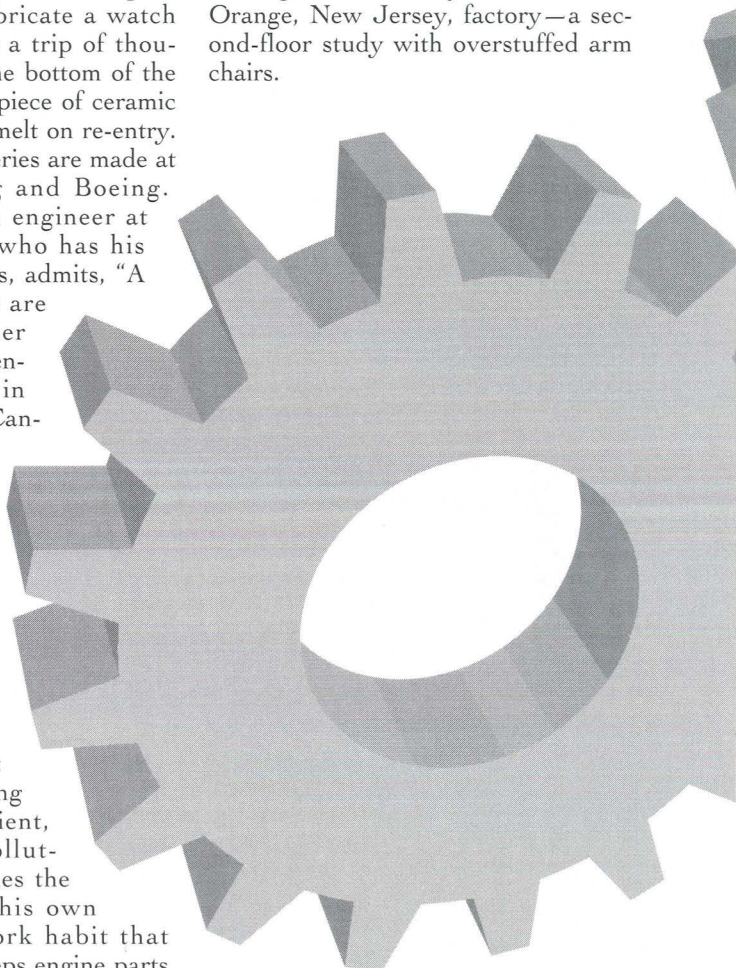
"I think best in my car, with the radio down low, trying to keep it from swerving off the road."

California easily led the individual states, nearly doubling runner-up New York. South Dakota and Wyoming were our least innovative states.

Maybe a small inventor will come up with the absolutely foolproof Roach Motel or bicycle lock, but the likelihood is virtually nil that an independent tinkerer will fabricate a watch case that can survive a trip of thousands of fathoms to the bottom of the Mariani Trench, or a piece of ceramic material that will not melt on re-entry. These kinds of discoveries are made at places like Corning and Boeing. David Candelori, an engineer at Pratt and Whitney who has his name on three patents, admits, "A lot of the inventions are team efforts." In other words, unlike the inventor who's soldiering in solitary in his attic, Candelori, who graduated from Syracuse University in 1983 with an undergraduate degree in mechanical engineering, goes to a lot of meetings.

Despite the somewhat antiseptic and decidedly unromantic group approach to jet engine design—making them more fuel efficient, quieter, and less polluting—Candelori relishes the notion that he has his own *modus operandi*, a work habit that works for him. He keeps engine parts on his desk and stares at them, occasionally puttering. He will daydream during normal office hours, but he often does his best work in his 1986

Honda CRX with 165,000 miles. "I think best in my car, with the radio down low, trying to keep it from swerving off the road," he says. Edison had nothing on Candelori as far as inspirational settings go. The great inventor had a very conventional "thought laboratory" in his West Orange, New Jersey, factory—a second-floor study with overstuffed arm chairs.





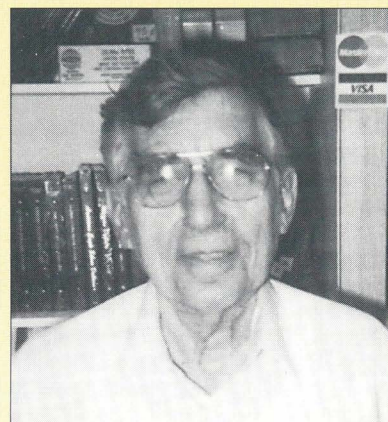
In the end it is the human psyche, in all its baffling disguises, that rewards and punishes the creative individuals forever searching to build a better widget. The marketplace is incredibly whimsical and terrifying. We have embraced the Walkman—built in an instant because Sony Chairman Akio Morita demanded portable, private classical music for his personal use—and rejected the virtually nonpolluting electric car, which has been “in development” for many decades.

The inventor is forever doomed to be a victim of the winds of consumer caprice, blowing in sneakers with blinking lights on one day and blowing Quadriphonic Sound out to sea on another.

Perhaps it is best in the long run for the nature of inven-

tion to cast its fate to the wind, at dead calm in some points in history and in a furious gale in others. That way, we never know what will come next. ■

Doug Garr, who earned his bachelor's degree in magazine journalism from Syracuse University in 1971, is a New York City-based writer specializing in science and technical subjects. His work has appeared in numerous publications, including Reader's Digest, Omni, Business Week, and New York magazine.



IN THE MAIL

In the late sixties, shortly after Sam Sloat got involved in coin dealing, he and his wife took a trip to Bermuda. Commemorative silver crowns happened to be on sale, so he bought a thousand and sold them when he got home.

The coins went quickly but Sloat found there was no readily available way to mail them safely. He had to place the silver-dollar-sized crowns between two index cards, staple the cards together, and stuff them into an envelope. This was functional, but not the most efficient or professional method to post the valuable coins.

After stuffing hundreds of coins, Sloat decided there must be a simple solution. He experimented with different sizes of corrugated cardboard coated with an adhesive that sticks only to itself, and invented the Safe-T-Mailer, a special packaging designed specifically to send coins off with care.

Sloat, who earned a bachelor's degree in chemical engineering from SU in 1940, received a patent for the Safe-T-Mailer in 1968 and has been manufacturing and marketing them ever since.

“They are the mailing device of choice in the coin business,” says Sloat of his lone invention. “There are thousands of dealers who use it regularly as well as people who use it for mailing other small objects.”

—Andrea C. Marsh

