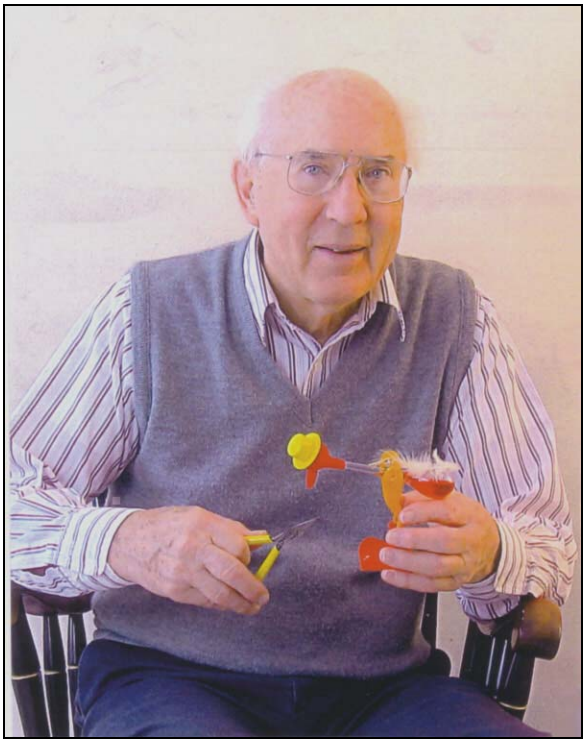
MILES SULLIVAN

"The Father Of Inventions"



June 26, 2006

Contact:
Dave Brodsky
DaSBro Enterprise
2760 Grand Concourse #3K
Bronx, NY 10458

phone: (718) 933-0633
fax: (718) 933-3563

*email:*dasbro@optonline.net

TABLE OF CONTENTS

Introduction

Miles Sullivan, 89, lives in Kalamazoo, Michigan. The father of three, grandfather of nine and, as of last year, a great grandfather, he is known for his invention of the bobbing bird - the bird that sits on the edge of a glass of water and perpetually bobs for water using no energy source. Miles worked for Bell Laboratories in Murray Hill, New Jersey for 35 years, his work yielding more than a dozen patents. He is still active, helping resolve computer problems for his friends and family, as well as fixing plumbing and electricity problems at the family cottage in Paw Paw, Michigan.

Fact Sheet

- Born Miles V. Sullivan in 1917; Winona, Minnesota
- Served In World War II, U.S. Navy, Lieutenant
- Ph.D. from Purdue University
- Married in 1948 to Evelyn
- Inventor
- Holder of numerous patents
- Settled in Summit, New Jersey
- Worked for 35 years at Bell Telephone Laboratories in Murray Hill, New Jersey
- Three children: Douglas: lawyer, Executive Vice President – Michaels Stores, Inc., Dallas, Texas; Anne: musician, teacher, Wheaton, Illinois; Daughter: Jane, Social Director Riverside Place, Midland, Michigan
- Widowed in 2004
- Currently residing in Kalamazoo, Michigan

"The Father Of Inventions"

All I could think about was how itchy the electrodes on my temples had become. But I couldn't let my mind linger there too long, because the physicists had an uncanny way of tracing my eye movements when I lapsed into a daydream. I was a test subject – officially. Unofficially, I was a 16-year old trying to earn college money at my father's laboratories.

Surrounded by musty books, disheveled papers, test tubes and, bulky components, I spent my school vacations enduring glued-on electrodes, refrigerator temperatures in the computer rooms and talking computers that had years to go before the warmth of a human voice would be programmed into them.

Just one of the many Ph.D. inventor-scientists at Bell Labs in Murray Hill, NJ, my father's credentials were fairly ordinary in that setting. But, he was far from an ordinary man and far from an ordinary father. As much as he loved pure science – the pride of every true scientist – he loved his family more.

Patience came easily to my father, and he never seemed to tire of his three children's unscientific minds.

"But, how does this work, Dad," was our perpetual theme. His answers were thematic too.

The sensor filament inside the toaster says to the release mechanism: "Our toast looks just crusty enough to eject now."

The soap says to the grease on your hands: "You're history!"

The battery's positive charge says to the negative: "Potentially, we could make a complete circuit."

The answers usually launched my brain into battle – the enthusiasm for gaining new information was tempered by a growing unease that most of our household appliances were struggling with multiple personalities. It could be laser beams, computer chips, the little bobbing bird that made my father internationally famous, or just the dial on a washing machine – in the end, they all assumed human personalities.

Difficulties can inspire humor and creativity – my father, Miles Sullivan, is proof of that. In central Minnesota of the early 1920's warmth and easy living were as common as, well, down jackets in Florida. I'm not sure if thoughts of this sort ever crossed my father's mind though. Whatever provided a challenge and whatever could be invented, or even reinvented, made him smile.

After his father died, a small one-room Winona store front - a tiny general store, complete with sewing supplies, food, gum and comic books – doubled as living quarters for my father, his brother and their mother. A small curtain near the back of the store did its best to partition off the boys' bed from the rest of the cramped store.

With limited heat and no hot water for bathing at home, my father and his brother were star struck by the luxuries offered at the local YMCA. By day their needs were well-served at the Y, but during cold Minnesota nights, nothing could prevent snow from blowing through the store's cracked walls, randomly accumulating by the beds.

By the end of high school it was apparent that his mind was capable of great things, but a lack of money stubbornly blocked my father's college aspirations. Months after graduation, an accidental meeting with a former math teacher settled the issue.

"Dodging college, Miles?" the teacher queried.

Disappointment was written on both of their faces.

"College is only a dream at this point," my father responded, mirroring his teacher's frustration.

"You need to be – you must be – in college Miles. I will get you there."

Single-handedly arranging a full scholarship to Wabash College, covering tuition, room and board, and even a steady job, the teacher couldn't have foreseen the additional degrees, a master's and Ph.D. from Purdue University.

With the ink on his undergraduate diploma barely dry, my father was drafted into World War II service – his main residence, The Naval Research Laboratory in Washington, D.C.

A four-year stint as a lieutenant in the Navy sparked ideas for several patents. As the war was drawing to a close, his partially finished assignment was to reduce the telltale bubble trails left by torpedoes; the trails worried the Allies because they gave the enemy advance warning of an impending attack. His emotions a mix of intrigue and trepidation, he would occasionally stand on a platform in the middle of Chesapeake Bay taking notes while comrades launched torpedoes directly under his feet.

What does one do after returning from a war? A Purdue University Ph.D. partially in hand, my father married my mother, a graduate student in English literature. Their non-traditional honeymoon was peppered with job interviews stretching from the east coast back to their roots in the midwest.

Bell Labs in Murray Hill, NJ quickly hired my father as a member of their semiconductor technology team. He soon acquired a series of

patents, including photo-mask lithography systems used in computer chip circuitry. He also developed new contacts that allowed energy to flow away from solar panels and into energy-consuming machines. These contacts are still widely used in communications systems as well as experimental projects like the Mars rovers.

Facts tumbled out of my father's brain like salt from a loosely-capped shaker. He must have been born with an extra curiosity gene, because his fascination with life permeated everything he touched. Except clothes. He was, and still is, a type of black hole in the fashion world. But my mother gracefully filled this problematic void. Presenting him to the world each day in passably matching navys or blacks, she got his ties tied, tuck-ins tucked in, and button-downs buttoned down.

Pursued by lawyers and marketers attempting to partner with him in business, my father stubbornly refused to stray too far from his love of pure science. During an interview soon after he gained the bobbing bird patent, an Associated Press reporter quoted him as saying, "My heart is not in business; my field is science."

But, he also liked having fun. In 1946 he patented the little toy bird that seems to bob endlessly for water without an apparent energy source. He called the little toy, "the drinking bird," and probably didn't dream that it would eventually be considered for advancing water irrigation systems in the Middle East, using the sun as its only energy source.

During a 1965 interview, he told reporters that although millions of the little birds had been sold, he never intended to make marketing a priority. Business took a back seat to just about everything my father held close to his heart.

Albert Einstein's encounter with the bird was reported in a 1964 *Time Magazine* story. After several days of theorizing about what propelled the little bird, the great physicist's attempts at unraveling the bird's secret proved futile.

At one point, Einstein believed he had the perpetual motion puzzle solved. His explanation was based on the assumption that gas in a tube within the bird alternately condensed and vaporized to shift weight, but he soon realized he had hit a flaw in his reasoning. Admitting defeat but remaining a purist, he refused to take apart the little bird in order to find a solution.

Talk of the puzzling toy continued. A reporter from *This Week* magazine wrote, "... the bird has fascinated and fooled scientists for years. A friend of mine ... had been to a big dinner and sat near President Herbert Hoover, and was delighted to hear him discussing the little bird. Mr. Hoover said that he, as an engineer, had thought a lot about it and finally guessed the secret. Was Mr. Hoover right, I asked. Nope – not even close!"

In 1949 a *Washington Post* reporter said that the drinking bird was the top entertainment feature in the House and Senate. Miles Sullivan hadn't yet set foot on Capitol Hill, but the little bird's feet had.

With the inside scoop on the bird's mechanics ingrained in our brains – and our egos – my brother, sister and I used to explain to our science teachers the details Einstein had missed. It was our brief moment of glory in the science spotlight, except for our run-ins with some of the lab-coated, bifocaled physicists at the laboratories. These colorful characters always struck us as an equal mix of kind, scary and quirky.

It was easy to see why my father fit in so well at the labs. It was a place where the building's passkey appeared to be: "above all else, let's never be routine – if it's new and different, let's develop it, and let's revel in it."

He's 86 now. He's still a mix of contentment and discontent that he can't reinvent everything he comes in contact with.

When toaster filaments converse about degrees of crustiness – and they do – my father is still listening in, taking notes, dreaming up a newer, better, and more chatty toaster.

The Bobbing Bird
(a/k/a The Dipping Bird, The Drinking Bird, The Dunking Bird)

Construction and materials

A drinking bird consists of two glass bulbs, joined by a tube (the bird's neck). The tube extends nearly all the way into the bottom bulb but does not extend into the top. The space inside is typically filled with coloured dichloromethane (also known as methylene chloride).

Air is removed from the apparatus, so the space inside the body is filled by dichloromethane vapour. The upper bulb has a "beak" attached, which along with the head, is covered in a felt like material. The bird is typically decorated with paper eyes, a blue top hat (plastic) and a single green tail feather. The whole setup is pivoted on a variable point on the neck.

Physical and chemical principles

The drinking bird is an interesting exhibition of several physical laws and is therefore a staple of basic chemistry and physics education. These include:

- The combined gas law, which establishes an inverse relationship between temperature and pressure exerted by a gas in a constant volume.
- The ideal gas law, which establishes an inverse relationship between number of gas particles and pressure in a constant volume.
- The Maxwell-Boltzmann distribution, which establishes that molecules in a given space at a given temperature vary in energy level, and therefore can exist in multiple phases (solid/liquid/gas) at a single temperature.
- Heat of vaporization (or condensation), which establishes that substances absorb (give off) heat when changing state at a constant temperature.

How it works

The drinking bird is basically a heat engine that exploits a temperature differential to convert heat energy to kinetic energy and perform mechanical work. Like all heat engines, the drinking bird works through a thermodynamic cycle. The initial state of the system is a bird with a wet head oriented vertically with an initial oscillation on its pivot.

The cycle operates as follows:

1. The water evaporates from the head (Maxwell-Boltzmann distribution)
2. Evaporation lowers the temperature of the glass head (heat of vaporization)
3. The temperature drop causes some of the dichloromethane vapour in the head to condense
4. The lower temperature and condensation together cause the pressure to drop in the head (ideal gas law)
5. The pressure differential between the head and base causes the liquid to be pushed up from the base.
6. As liquid flows into the head, the bird becomes top heavy and tips over during its oscillations.
7. When the bird tips over, the bottom end of the neck tube rises above the surface of the liquid.
8. A bubble of vapour rises up the tube through this gap, displacing liquid as it goes
9. Liquid flows back to the bottom bulb, and vapour pressure equalizes between the top and bottom bulbs
10. The weight of the liquid in the bottom bulb restores the bird to its vertical position

If a glass of water is placed so that the beak dips into it on its descent, the bird will continue to absorb water and the cycle will continue as long as there is enough water in the glass to keep the head wet. However, the bird will continue to dip even without a source of water, as long as the head is wet, or as long as a temperature differential is maintained between the head and body. This differential can be generated without evaporative cooling in the head -- for instance, a heat source directed at the bottom bulb will create a pressure differential between top and bottom that will drive the engine. The ultimate source of energy is heat in the surrounding environment -- the toy is not a perpetual motion machine.

The drinking bird in popular culture

Due to the brilliance of the harmony of scientific precision that allows it to function, and its totally hypnotic, captivating, mesmerising bobbing up and down, the bird was an instant hit upon its creation and achieved near iconic status. It has even "cameoed" in the American TV show The Simpsons, in the episodes "Brother Can You Spare Two Dimes?" and "King-Size Homer". In the former episode, the drinking bird is used by Homer's half-brother Herb Powell as an example of a great invention. In the latter episode, Homer uses the drinking bird to operate the Y key (for "yes") on his work-at-home computer that controlled the necessary venting of gas for the nuclear power plant. Unfortunately, Homer neglects to check on the bird and it falls over, creating a critical situation in the area under Homer's control. A drinking bird also appears in the 1951 Merrie Melodies cartoon "Putty Tat Trouble". Tweety Pie spies one "drinking" from a glass and, mistaking it for a real bird, asks if he can join it. Tweety mistakes the toy's bobbing motion for a nod of assent and joins it, imitating its back-and-forth movement exactly. Shortly, Sam, another cat who is fighting with Sylvester over Tweety, swallows the drinking bird by mistake, and his body then uncontrollably mimics the same bobbing motion.

Source: http://en.wikipedia.org/wiki/Drinking_bird

Newspaper/Magazine Articles

HARPER'S MAGAZINE
September 1964—Page 48

EINSTEIN: AN INTIMATE MEMOIR

My brother once gave the Professor a tricky toy. A little bird stood on the edge of a bowl of water and kept dunking its head and raising it from the water, as if in perpetual motion. Einstein sat and watched it in delight, trying to deduce the principle that made it work. He couldn't.

The next morning he came down from his room and said, "I thought about that bird for a long time when I went to bed, and it must work this way . . ." He began a long explanation, based on the assumption that gas in a tube within the bird alternately condensed and vaporized to shift weight. Then he stopped when he hit a flaw in his reasoning, saying, "No, I guess that's not it."

He pursued various theories for several days, until I suggested that we take the toy apart to see how it did work. The quick expression of disapproval on his face told me he did not agree with this practical approach. He never did work out the solution.

Harper's Magazine, September 1964

WASHINGTON POST
February 14, 194?

Perpetual Motion?

Washington, Feb. 14 (AP)—Representative Joe Hendricks has the darndest thingamajig on his desk.

It has been the No. 1 entertainment feature on Capitol Hill this week, House and Senate notwithstanding.

It is a bird of sorts, of glass and cotton, 3 inches long. It sits atop a water glass, leisurely bobbing about and running his beak into the water, as sparrows do in the front yard bird bath—except that it never stops.

At least it hasn't stopped in three days, and it was bobbing about at the home of the inventor, Lieut. Milan Sullivan, of the Naval Research Laboratory here for six months before he gave it to Hendricks.

Its air-tight glass tummy has a hollow glass tube down the center and is partially filled with water. Hendricks's secretary, Harold Boire, explains a perfect balance, the flow of water through the tube and the wetness or dryness of the bird's yellow cotton-filled bill "has something to do" with the continual bobbing.

TIME MAGAZINE
September 4, 1964—Page 50

PEOPLE

. . .

There is nothing more endearing to the less-than-great than to hear the human foibles of the unquestioned great. On that score, Albert Einstein was one of the most endearing greats of all. And in this month's *Harper's*, Dr. Thomas Lee Bucky, son of Einstein's friend, Physician Gustav Bucky, fondly passes on some more of those myriad foibles. The professor read Emily Post for laughs, thought chess "unproductive," played a mediocre violin, felt two baths a week were sufficient, and never once displayed "jealousy, vanity, bitterness, anger, resentment or personal ambition." But most endearing of all, the nonpareil theorist couldn't figure out those scraggly toy birds that dip in and out of a bowl of water in perpetual motion. He spent several days trying to dope it out, but never found the answer. Reassuring, isn't it?

PAGE 50 TIME, SEPTEMBER 4, 1964

THIS WEEK MAGAZINE
November 25, 1962

"The bird has fascinated and fooled scientists for years. A friend of mine once told me that he had been to a big dinner and sat near President Herbert Hoover and was delighted to hear him discussing the little bird. Mr. Hoover said that he, as an engineer, had thought a lot about it, and had finally guessed the secret."

"Was Mr. Hoover right?" I asked.

"Nope — not even close."

"What is the secret then?"

THIS WEEK Magazine / November 25, 1962

TIME MAGAZINE
September 18, 1964—Page 22-24

Puzzling Guzzler

Sir: Knowing that Albert Einstein could not figure out those "scraggly toy birds that dip in and out of a bowl of water in perpetual motion" [Sept. 4] won't make us average intellects feel any better unless we ourselves know the causative factors involved. So come on, spread a little sunshine by letting us in on the secret.

JAMES M. SMITH

New York City

▶ *Had Einstein stripped the guzzling bird of its plumage, the answer might have been clear. The bird's bottom is actually a sealed bulb containing ethyl ether (or a similar volatile liquid); the bird's head is a smaller bulb, with a tube connecting head to tail. To start the bird dunking, it*

BEN MARTIN

is only necessary to wet the head of the bird in its upright position. The cooling action, caused by the water's evaporating, condenses the vapor within the head, creating a slight vacuum. The ethyl ether liquid then pushes up through the tube and into the head, causing the bird to duck downward. When the tube in the tail bulb rises clear of the liquid, the vacuum is broken, and the liquid in the head flows back into the tail, thus righting the bird.—ED.

TIME, SEPTEMBER 18, 1964

January 17, 1965

Portrait of a Bobbing Bird—and its Creator

Toy Sold Well, but Summit inventor passed Up Profit for Science

By ALBERT M. SKEA

Dr. Miles Sullivan of Summit, creator of the bobbing bird, never fully capitalized on his invention though millions of these toys were sold while the now-expired patent was in force.

To most, the fascination of the birds is how they are able, without any obvious source of power, to duck their bills in and out of water for hour after hour when placed on the rim of a glass.

The late Albert Einstein, whose theory of relativity is understandable only to a few, was reported to have been baffled by the bobbing of the birds, because the "mechanics" are concealed by the exterior. He was in good company. Most people are still baffled by the bobbing birds.

Some 50 companies were in the bobbing bird business at one time. Dr. Sullivan says he collected royalties from only two. Others were difficult to trace, since some operated from home garages and basements.

Science Came First

The Summit scientist reflects that he could have made much more money from his invention if he had desired to devote full time to it for a while. "My heart is not in business," he explains. "My field is science."

Dr. Sullivan is a member of the semiconductor device technology department at Bell Laboratories, Murray Hill.

(OVER)

NEWSLINES Aug 23, 1965

ıiature is loaded and hauled from Iron Hill to Lilliputian Steel go and Western Railroad. Art Kaufman operates this latest d built in his spare time over the past 16 years. An avid little caboose he has with a "speaker's platform" on the ufman."

ers 'Steamed Up' el Locomotives

: mining village named Iron Hill, the tiny steam engines ad can be dispatched to the four corners of the model y Giant that owns, operates and is chief engineer for the cableman.

Bell Brain Builds Baffling Bobbing Birds

Albert Einstein might have known all about this E=MC² business, but he never could figure out how the bobbing birds operated. Too bad he didn't ask Bell Labs' Miles Sullivan. For Sullivan, you see, was the inventor of those little plastic birds that sit on the edge of a glass of water and bob up and down by the hour.

It all started in 1941, when Sullivan was a graduate student in physical chemistry at Purdue University. Sullivan, enjoying a break from his studies at a student hangout, became fascinated by the bubbling lights adorning a jukebox, decided that a heat source near the bottom of the tube was generating the bubbles. That sent him back to the laboratory, where he tinkered for months building a "heat engine" using that principle.

He found that by partially filling a glass tube with a vaporizing liquid and maintaining different temperatures at either end of the tube (warm at one end, cold at the other), the liquid would evaporate, form a gas, and push the remaining liquid to the top of the tube. This would make the tube top-heavy and tip it forward. Gravity would then take over and pull the liquid back to the bottom of the tube, causing it to tip back to its original position. Sullivan enclosed the tube in the shape of a bird and the bobbing bird was born.

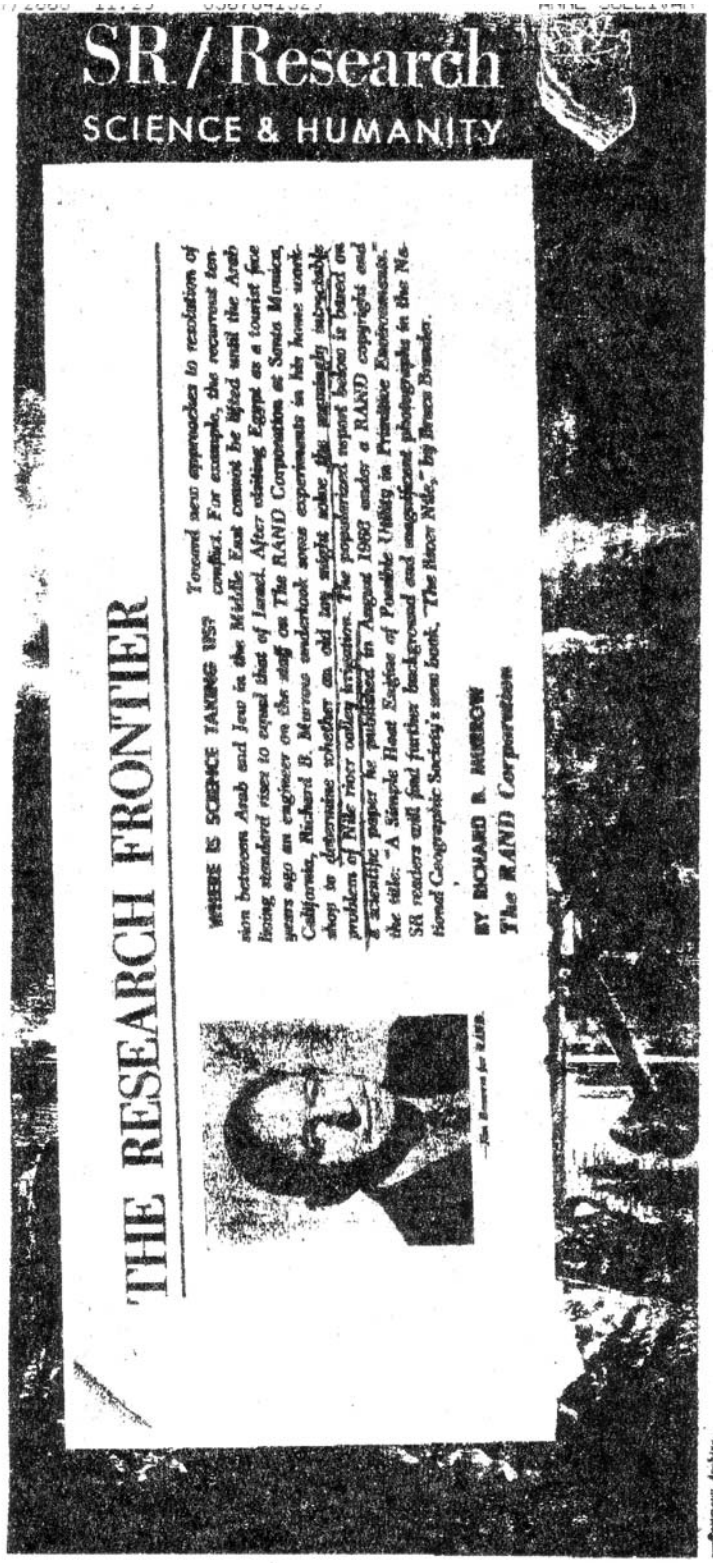
(In operation, the water in the glass cools the heat of the bird each time it's dunked, while the tail-feathers remain at room temperature, thus causing the vaporizing liquid, the gas it produces and gravity to bob the bird up and down.)

Still don't understand it? Don't feel bad. Einstein didn't either.

Kraft Satin Inventories

Saturday Review

June 3, 1967 35c



NEW WATERBIRD FOR EGYPT

A ROBOT SHADOOF

WHEN the present United States Ambassador to Egypt, Richard Nolte, left his Connecticut house to take up his new diplomatic post in Cairo a few weeks ago, he had in his possession a toy bird with a red head, a pot belly, a green tail, yellow legs, big red boots, and a one-track mind. Once set within appropriate distance of an adequately filled glass, this mechanical creature occupies its time exclusively in wetting its beak, leaning back, wetting its beak, leaning back, and wetting its beak again.

The Ambassador told me he would put the bird on top of his desk in the Embassy and attach a one-word label: *shadoof*.

He said everybody in Egypt would get the message immediately upon seeing the bird's head dip into the water.

Those who are unfamiliar with the *shadoof*, the most ancient and primitive water-lifting device in Egypt (shown in action in the drawing at the left), may read the meaning of the "drinking bird" toy in a following RESEARCH FRONTIER report. Rather than anticipate that interpretation, I shall use this introductory space to explain why I gave the only model of the bird that I had to Ambassador Nolte.

Certainly I acted under no illusion about the State Department's eagerness to take science seriously as a force in foreign policy. Science Attachés are scattered in U.S. Embassies around the globe (among them is one in Cairo), but Secretary of State Dean Rusk has pointedly left unfilled the science affairs directorship of the department in Washington, the one place in American diplomacy where global effectiveness can be

Richmond Times-Dispatch, Sun. Feb. 11, 1979

Inventors' Let Themselves Go

By The Associated Press

Why doesn't somebody invent gadget that would...

Fill in the blank yourself. It's National Inventors Day and time to let your imagination wander.

In advance of today's celebration of American ingenuity, The Associated Press asked a random cross-section of people what inventions they would like to see and why.

The answers ranged from the practical — "an automatic floor-mopper" — to the philosophical — "a machine to eliminate greed."

A few people couldn't think of anything new that was needed. "I wish for a lot of stuff, but it's already been invented," said Karen Dingman, 24, of Des Moines, Iowa.

One of the best suggestions came from Brent Nicholls of Omaha, Neb., who's 10 years old and in the fifth grade. "I'd like to have somebody invent a pencil that will write what you tell it to write," he said.

Also from Brent: "A car that can be folded up very small to help make parking easier."

The automatic floor-mopper is the wish of Kathryn Faulk of Oklahoma City. Why? "Because I hate mopping floors. I hate it. I hate it."

On Inventers Day Articles using the same picture, but telling various stories appeared in many papers including:

Chicago
San Diego
Milwaukee
Columbus
Binghamton
Stroudsburg
San Juan

Some of the titles:

PATENTLY PROLIFIC

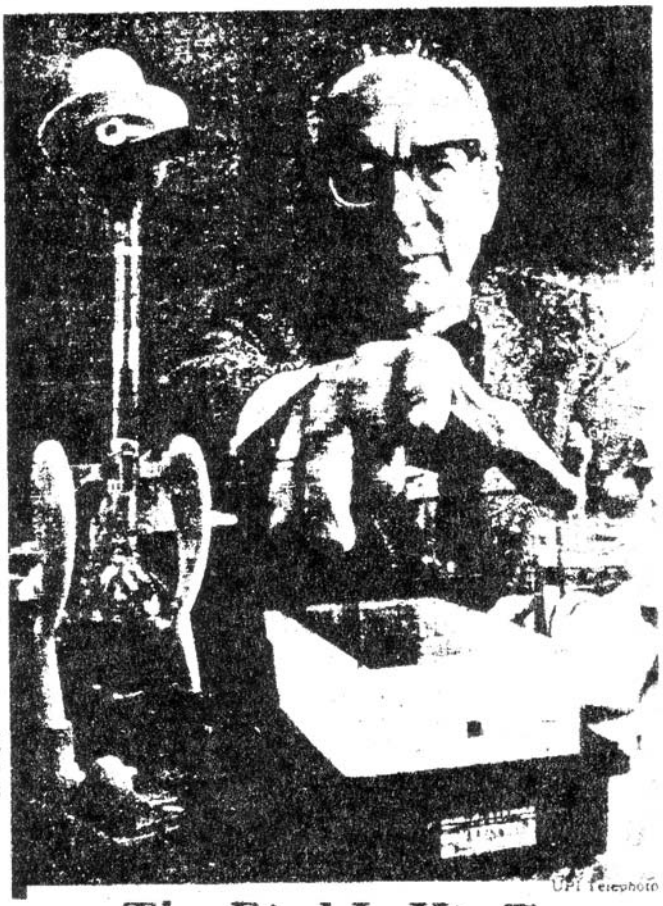
PERPETUAL INVENTOR

SOME TRACK RECORD

PLENTY OF PATENTS

BELL INVENTOR

BELL BRAIN-BUILDS BAFFLING BOBBING BIRDS



UPI Telephoto

The Bird Is His Too

Scientists and engineers at Bell Laboratories at Murray Hill, N.J., have been issued an average of a patent a day for more than 50 years. The list includes the transistor and the silicon solar cell. One of the scientists, Miles Sullivan, has kept right on being creative on his own time. Credited with several patents on see-through photo masks used in the manufacture of integrated circuits, Sullivan also invented the "drinking bird," a toy that appears to use a perpetual motion scheme and has been a fixture in novelty store windows for years.

over

business

From the
CHICAGO SUN-TIMES
February 13, 1979

es above the official
barrel last month.
Oil Co. auctioned 2
o $18.50, and Saudi
16, according to the
Survey in Bahrain.
because of the cut-
strife-ridden Iran.
onfirmed its higher
and Standard Oil of
ek there had been a
ts a barrel. In related
etary general of the
um Exporting Coun-
ans for an extraordi-
nference. Present oil
to avert undue pres-
e said, and it would
re a supply problem

oring has been in-
administration in the
cent gain in January
ed Kahn, chief infla-
price increases shown
report will be com-
price-guidelines com-
ted by companies on
e administration, fore-
lation in 1979 is likely
," and that increasing
be explained by bad
prices. Kahn said
ther t

Plenty of patents

Miles Sullivan, a scientist at Bell Labs in New Jersey, is one of many Bell scientists who together have been issued an average of one patent a day for more than 50 years. Sullivan, who also invents things outside work hours, has several patents on "see through" photomasks used in the manufacture of integrated circuits and on noncommunications devices including the drinking bird—what appears to be a perpetual motion toy frequently seen in store windows. (UPI)

Re
lac
na
in

NEW
former pr
federal pr
decided
that three
Indonesia
eased out
Times re
Quotin
eral inve
now pr
Chrysle
named th
as Paul
John Ke
ward I
ery
Ford
ly said
agement
in Augu
plan to
lion brib
$29.6-m
sian c
num

Patented June 18, 1946 2,402,463

UNITED STATES PATENT OFFICE

2,402,463

NOVELTY DEVICE

Miles V. Sullivan, Washington, D. C., assignor, by mesne assignments, of one-half to William C. Clay

Application August 6, 1945, Serial No. 609,114

6 Claims. (Cl. 46—124)

THE WALL STREET JOURNAL THURSDAY, APRIL 26, 2001

This was my concern and responsibility and the subject of many patents during my last 20 to 30 years at BTL. It is also the subject that I taught for 2 years. DAD

Why Chip Firms Want U.S. to Let SVG Go to Dutch

By Don Clark and Glenn Simpson
Staff Reporters of The Wall Street Journal

Eleven years ago, several major U.S. electronics companies rallied to keep a sophisticated technology for making computer chips from falling into foreign hands. Now, executives from some of the same companies are alarmed that a new generation of the same technology may *not* be acquired by a foreign company.

Times have changed, but not the intense corporate and government interest in photolithography, a technology for drawing lines of circuitry that largely drives the speed and storage capacity of semiconductors. Stop improving lithography, many experts say, and the entire ecosystem of electronics is threatened. Declares Andrew Grove, chairman of Intel Corp.: "The future of the U.S. semiconductor industry is at stake."

What has Mr. Grove so exercised is the fate of big Japanese maker of lithography tools. ASML, though also a foreign company, has joined a Livermore, Calif., consortium to develop the EUV technology and has agreed to build a U.S. factory for its American sales of chip-making tools based on it. Nikon and Canon are not members; they are working on a separate EUV project with backing from the Japanese government.

Lithography systems, known in industry parlance as steppers, have traditionally used lenses to focus beams of light for tracing patterns of transistors on silicon wafers. The new EUV systems combine lasers with mirrors to draw much smaller lines. Where today's high-end chips have circuits with a width of about 180 nanometers—or billionths of a meter—EUV technology is expected to shrink circuitry to as small as 10 nanometers, or one-eighteenth of that size, said Chuck Gwyn, program director of EUV LLC, the consortium working on develop-

Papken Der Torossian, SVG's chairman and chief executive, is no stranger to geopolitics. An Armenian born in Turkey and raised in Syria, he spearheaded the company's deal with Perkin-Elmer more than a decade ago, citing both business reasons and a desire to preserve U.S. competitiveness.

Now his motivations are mainly financial. SVG yesterday reported that first quarter net income declined 47% to $6.1 million, or 17 cents a share, from $11.6 million, or 35 cents a share, a year earlier. Revenue rose only slightly, to $206.8 million from $204.6 million.

"They mean well, but they are misinformed," Mr. Der Torossian said of the deal's critics. "They are going to cause me to go bankrupt."

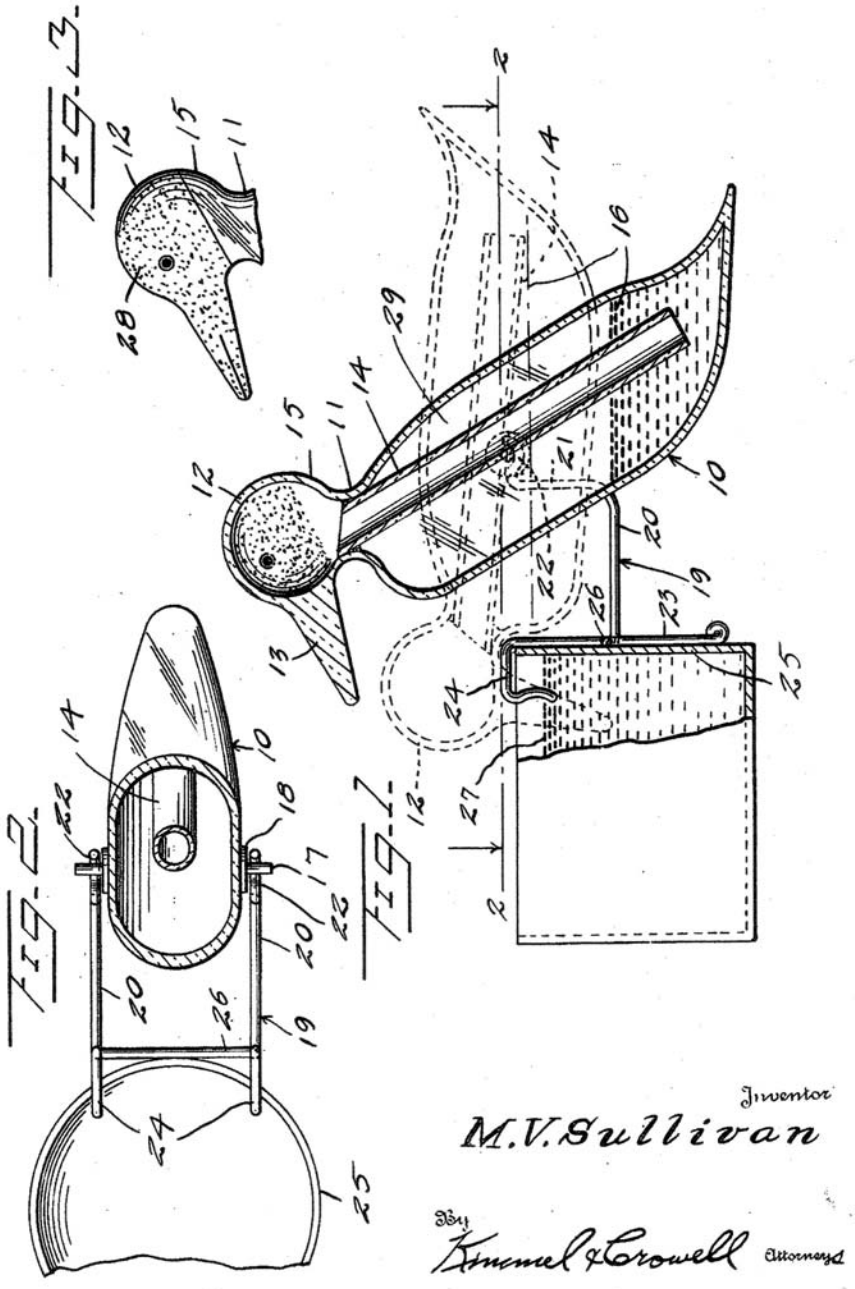
The Bush administration yesterday seemed to be trying to buy time. Spokesmen insisted that a government group called the Committee on Foreign Investment in the

U.S. Patent Office; Registration # 2,402,463; June 18, 1946; Novelty Device

June 18, 1946. M. V. SULLIVAN 2,402,463

NOVELTY DEVICE

Filed Aug. 6, 1945



Inventor
M. V. Sullivan
By Kenmel & Crowell Attorneys

Patented June 18, 1946 2,402,463

UNITED STATES PATENT OFFICE

2,402,463

NOVELTY DEVICE

Miles V. Sullivan, Washington, D. C., assignor, by mesne assignments, of one-half to William C. Clay

Application August 6, 1945, Serial No. 609,114

6 Claims. (Cl. 46—124)

1

This invention relates to a power device useful in actuating amusement and advertising devices and the like.

Power devices usually require considerable attention or expenditure of fuel or electricity for their operation whereas this invention appears to the casual observer to be an example of perpetual motion. Actually, this device requires no attention and requires no fuel in the ordinary sense, as its operation may be effected by atmospheric phenomena associated with ambient air. The power, therefore, is created by the inherent characteristics of this invention, and the principle may be utilized for supplying power to various articles or devices where movement of the whole device or parts thereof is desired.

Specifically this device is shown as adapted to a bird form that rotates about a support and dips in and out of a container of water, which operation is effected by evaporative cooling in common ambient air, arranged in such manner as to maintain a temperature differential of the parts.

The entire hollow structure is shaped into a bird form with two divided spaces arranged so that the head and body may be maintained as cool and warm portions respectively. An elongated hollow member, in the form of a tube, extends from the boundary of the head at the point of juncture with the body to an appropriate distance into the interior of the body. A beak, attached to the head, is maintained in a wetted state by constant dipping into a dish of water with each oscillation of the device. This beak may be formed of separate wicking material that extends over the head or it may be formed as a part of the head structure and surfaced with an absorbent medium, or the surface of the beak and head may be granulated so as to serve as a wick and thus maintain the head in a wetted state.

Evaporative cooling will then maintain the head at a temperature lower than that of the ambient air depending on the relative humidity. The body of the bird, being not subject to evaporative cooling but having a relatively large area exposed to the ambient air will be maintained approximately at the temperature of the ambient air. Thus a temperature differential will be maintained between the two parts and the device will operate as described.

With the above and such other objects in view, as may hereinafter more fully appear, the invention consists of the novel construction, combination and arrangement of parts, as will be hereinafter more fully described, and illustrated in

2

the accompanying drawing, wherein are shown embodiments of this invention, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention, as claimed.

In the drawing:

Figure 1 is a vertical sectional view of a device constructed according to an embodiment of this invention.

Figure 2 is a sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a fragmentary side elevation of the head or beak of the device.

Referring to the drawing the numeral 10 designates generally a hollow body which, in the present instance, is formed in the configuration of the body of a bird, which includes a neck portion 11, having a hollow head 12 extending therefrom and a beak 13. The body 10 has extending lengthwise therein a tube 14 which terminates at its rear or lower end at a point within the body 10, and suitably spaced from the rear end thereof so as to be positioned below the level of a pool of liquid 16 at the beginning of each cycle of operation. The tube 14 terminates at its upper or forward end at the entrance to the head 12 and is firmly sealed, as at 15 as shown in Figure 1, in the neck 11 in such manner as to provide the only means by which the interior of the head 12 may communicate with the body 10.

The interior of the body 10 and the head 12 is initially substantially evacuated of air and is charged with a quantity of vaporizing medium in excess of the amount necessary to maintain vapor saturation at normal room temperatures. The vaporizing medium may be any suitable fluid which will readily vaporize and condense at ordinary room temperatures and within reasonable working pressures, such as ether, alcohol, carbon tetrachloride or chloroform.

The body 10 is also charged with a pool of liquid 16 of a kind that does not materially affect the vapor pressure of the vaporizing medium and in sufficient quantity to effect a seal at the bottom of the tube 14 between the head and the body during the initial cycle of operation and to effect the desired change of balance of the device throughout the operating cycle.

The head being the cool end of the device will have a lower vapor pressure than the body 10, so that this pressure differential effects movement of the liquid 16 from the body 10 to the head 12.

The body 10 is rockably supported on a pair of laterally extending trunnions 17 carried by plates

18 which are fixed to the outer side of the body 10, in any suitable manner such as by adhesive or the like, and the trunnions 17 are so positioned relative to the length of the body and head that the liquid forced upwardly into the head 12 by the vapor pressure in body 10 will over-balance the body and cause the same to rock downwardly to substantially the dotted line position shown in Figure 1.

The body 10 is rockably supported on a pair of bracket arms 19 including a pair of horizontal arms 20 having vertical arms 21 extending from the outer ends thereof and the vertical arms 21 are formed at their upper ends with arcuate saddles 22 within which the trunnions 17 are adapted to rockably engage.

The arms 20 have secured to the inner ends thereof vertical supporting bars 23 which are formed at their upper ends with hooks 24 for engagement over the upper end or rim of a liquid receptacle 25.

The vertical bars 24 are also connected together by a horizontal connecting bar 26. The receptacle 25 is adapted to have a cooling medium in the form of liquid, such as water or the like, disposed therein which is at a level, as indicated at 27, so that when the bird rocks downwardly the beak 13 will dip into the water or liquid. At the time the beak 13 is immersed at least partially in the liquid in the receptacle 25 the tube 14 is at an angle slightly above the horizontal, as shown in dotted lines in Figure 1, so that the seal between the tube 14 at the bottom thereof and the liquid in body 10 will be broken and the liquid in the head 12 can readily flow downwardly through the tube 14 back into the body 10 of the bird.

In order to assist in providing a relatively cool head and beak, the outer surface of the head and the beak may be coated with granular particles, as indicated at 28, so that the beak will retain a substantial amount of the cooling medium after the beak is raised to its uppermost or full line position, shown in Figure 1.

It will be understood that, if desired, the beak and head may be coated with a fabric which will serve as a wick in order to retain sufficient moisture to provide for forming a temperature differential between the head and the body of the device.

Normally the rear end of the body is maintained at substantial room temperature and the head and the beak, which constitute the cool end of the device, are maintained at a slightly lower temperature than the room temperature so that when the liquid is entirely disposed within the body 10, the higher vapor pressure in the vapor chamber 29 which is above the liquid 16 in body 10 will cause the liquid to flow upwardly into the head 12 and thus repeat the operating cycle.

As the device is normally disposed at an angle to the vertical, a small amount of liquid in the head 12 will cause the device to rock downwardly until the lower side of the neck 11 contacts the rim of the receptacle 25, at which time the beak 13 is immersed in the water and the liquid seal at the lower end of tube 14 is broken.

The device may be made as an article of amusement or a power device, and the device will operate through its condensing, vaporizing and pressure differential cycles, the time between each cycle being dependent on the temperature differential between the warm and cool ends of the device.

What I claim is:

1. A power unit comprising a hollow elongated body, a hollow member at one end of said body, a tube within said body and communicating at one end with said member, a volatile liquid in said body, vaporization of said liquid in said body producing a pressure whereby a portion of said liquid will be forced into said member, means rockably supporting said body whereby the latter will rock downwardly to position said tube at the opposite end thereof at least partially out of the liquid in said body whereby the liquid in said member will gravitatingly flow through said tube and back to said body, and means carried by said member for effecting a temperature differential between said member and the opposite end of said body.

2. A power unit, as set forth in claim 1, wherein said last named means comprises moisture retaining means on the exterior of said member.

3. A power unit, as set forth in claim 1, wherein said last named means comprises a fibrous element carried by said member.

4. A power unit as set forth in claim 1, wherein said last named means comprises granular means fixedly carried by said member.

5. A self-contained rocking toy comprising a water receptacle, water in said receptacle, a bird simulating member, and means rockably mounting said member on said receptacle, said member comprising a hollow elongated, substantially evacuated body, a hollow condensing member at one end of said body, a tube within said body extending lengthwise thereof and communicating at one end with said condensing member, and means carried by said condensing member adapted to periodically contact the water in said receptacle whereby to produce a temperature differential between said condensing member and said body.

6. A novelty device comprising a pair of hollow members, a tube extending between, and communicating with, said members, said tube at one end thereof extending into one of said members and having a free end therein, means rockably supporting said members, a weight carried by the other member, means carried by said weight for effecting a temperature differential between said members, and a volatile liquid normally disposed in said one member, the free end of said tube being normally immersed in said liquid, vaporization of some of said liquid in said one member producing a pressure on the remainder of the liquid whereby a portion of said liquid will be forced into the other member to thereby effect downward rocking movement of said other member to a degree whereby the free end of said tube will be at least partly out of the liquid in said one member, and said tube will be inclined to the horizontal to thereby provide for the gravity flow of liquid from said other member to said one member.

MILES V. SULLIVAN.