

Ten More Stories

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The Ones That Did Not Fit in Nobody Meant To
Invent This

Peter Livingston

Long Porch Books

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Before You Begin

Thank you for asking for these.

Ten stories were written and did not go into the book. Some ran short. Most of them came out because they broke the promise the book makes on its first page, which is that nobody in it set out to invent anything.

Everybody in here set out.

Josephine Cochran sat down with her husband's debts and built a machine on purpose. Margaret Knight spent two years on wooden models and then had to go to the Patent Office to get her own invention back off a man who had watched her build it. Mary Anderson drew hers on a streetcar in the sleet.

They are the same kind of story told from the other side. Not an accident that found

somebody, but somebody who saw a problem everybody else had stopped noticing, fixed it, and in almost every case watched the money go to somebody else.

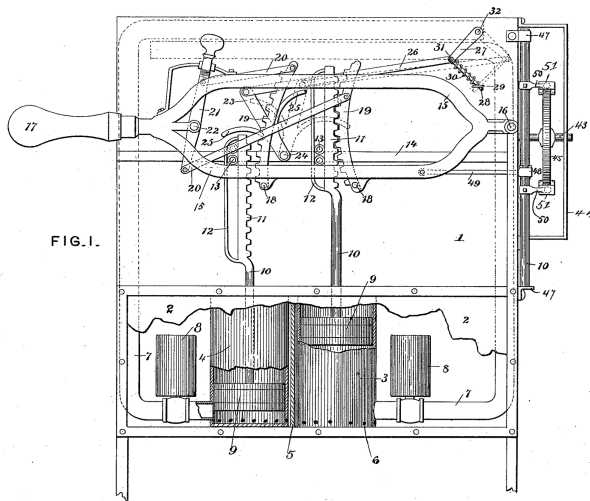
One story at the end is a genuine accident, and it happens three months after a story in the book you already have.

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CHICAGO, ILLINOIS · 1887

The Lobby She Could Not Cross



Josephine Cochran's "Dish-washing Machine," filed on the last day of 1885 and granted in December 1886. Figure I is the front of the machine; the crate of dishes turned inside while the water sprayed.

A woman stood at the edge of the lobby of the Sherman House hotel in Chicago and could not make herself walk across it.

She was forty-eight. She had an order to ask for and a machine worth asking about,

and years later, when a reporter wanted to know what the hardest part of going into business had been, she did not say the engineering.

She said crossing the great lobby of the Sherman House alone.

Her name was Josephine Cochran, and the reason she was there is not the reason the story usually gives.

The usual version has her at a dinner party in a fine house, watching a servant chip the good china, and declaring that if nobody else was going to invent a dishwashing machine she would do it herself. It is a lovely scene. No letter, no diary and no interview has ever been produced for any part of it, and the quotation has been repeated for a century without anyone naming where it came from.

What can be checked is duller and much harder.

Josephine Garis married William Cochran in 1858 and went to live in Shelbyville, Illinois. He sold dry goods, ran for office, and had failed at gold in California before she met him. They had two children. A son, Hallie, died at two. A daughter, Katharine, did not.

He died in 1883.

What he left her was one thousand five hundred and thirty-five dollars and fifty-nine cents, and debts.

She filed her patent application on the last day of December 1885. It was granted the following December, number 355,139, and the title printed at the top of it is not clever or memorable. It says **Dish-washing machine**.

She was not the first to try. Joel Houghton had patented one in 1850 and a man named Alexander another in 1860, and both of them worked the same way, which is to say they scrubbed. Something

inside the box rubbed at the dishes and the dishes came out chipped, or came out dirty, or both.

Cochran's did not scrub anything.

She measured plates, cups and saucers, and built wire compartments to fit each shape. The compartments sat in a wheel inside a copper boiler, and the wheel turned while hot soapy water was driven up at the dishes under pressure. Water did the work. Nothing touched the china but the water.

A mechanic named George Butters built the machines in a shed behind her house.

Then she had to sell them, and this is where the lobby comes in. In 1887 a respectable woman did not walk into a hotel and ask for the manager. There was no polite category for what she was doing. She did it anyway, and the Sherman House gave her an order for eight hundred dollars' worth. A friend got her in to see

the manager of the Palmer House, and the Palmer House ordered too.

In 1893 the World's Columbian Exposition opened in Chicago, and nine of her machines were installed in the restaurants and pavilions feeding the crowds. They won the fair's prize for best mechanical construction, durability, and adaptation to their line of work.

She built a factory in 1898 and made Butters the manager.

She said one thing about the men who worked for her that is worth having. *I couldn't get men to do the things I wanted in my way until they had tried and failed in their own.*

The machines sold to hotels, hospitals, colleges and restaurants, and almost nowhere else. They cost seventy-five to a hundred dollars, which put them past any household in the country, and they needed a supply of hot water at a pressure most

houses did not have.

Josephine Cochran died in Chicago in 1913.

The dishwasher did not arrive in ordinary American kitchens until the 1950s and 1960s, which is another forty years, which is to say that the woman who built the first one that worked never saw one in a kitchen. She only ever saw them in the back rooms of hotels, steaming, with a man she had hired standing next to them.

She is not in this book's main collection for a specific reason. Everybody else in that book was trying to do something else when they found what they found. Frank Epperson wanted a cold drink. Alexander Fleming wanted a clean bench.

Josephine Cochran sat down in 1883 with fifteen hundred dollars and a pile of her husband's debts, worked out that the thing she knew best in the world was a table set for dinner and what it took to

clear it, and built the machine on purpose.

There was no accident anywhere in it.

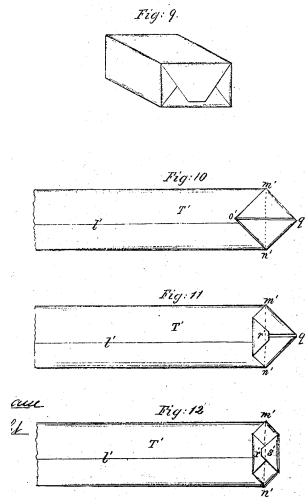
She had to cross the lobby herself.

THINGS TO TALK ABOUT

- What was the first thing you ever had to do entirely on your own?
- Was there a job in your house that everybody agreed was the worst one?

BOSTON, MASSACHUSETTS · 1870

The Machine in the Third Shop



Margaret Knight's 1871 machine patent. Most of the twelve figures are the machine. Figure 9 is the bag it made, flat bottom and all, and figures 10 to 12 are the folds that make it.

In April 1870 the Patent Office rejected Margaret Knight's application on the grounds that somebody else had already patented her machine.

The somebody else was named Charles Annan. He had seen the machine. That was not in dispute and never became disputed, because the machine had been built in an iron shop in Boston, in the open, where people walked past it.

Knight asked for a hearing three days later.

She was thirty-two years old and she had been making things since she was twelve. Her father was a machinist and two of her brothers were machinists, which is worth saying because the story is usually told as though she came to it out of nowhere.

She had started in the cotton mills of Manchester, New Hampshire, after her father died. At about twelve she watched a steel-tipped shuttle come loose from a loom and strike a worker, and she worked out a restraint to stop it happening. The Manchester mills adopted it. She never patented it and was never paid a cent for it,

and she was a child, and nobody thought to tell her that either of those things was unusual.

Her health gave out in the mills in her late teens. After that she did home repairs, daguerreotype work, engraving, and upholstery, in that order, and in 1867 she took a job at the Columbia Paper Bag Company in Springfield, Massachusetts.

Paper bags in 1867 were envelopes. They were made like envelopes and they behaved like envelopes, which is to say they were useless for anything with corners or weight. A grocer could not put potatoes in one.

Knight wanted a bag with a flat bottom, and a machine that would fold and glue and cut one without a person touching it.

She spent about two years on wooden prototypes. Then she needed the thing in iron, and iron meant a machine shop, and a machine shop meant the floor of somebody

else's building.

Annan filed first.

What happened next took sixteen days of hearings. She brought prototype parts. She brought bags the machine had made. She brought years of drawings with dates on them and diary entries, and she brought seven witnesses, including machinists from every one of the three shops that had worked on her models.

Her brother Charles testified that she had shown him a model and that he had watched it make a great many bags. A woman who boarded in the same house testified that Knight had been drawing continually, and always the machine.

Annan did not testify.

His lawyers cross-examined and put on no case of their own.

Here the story is usually told with a line in it that is not in the record. Annan is supposed to have argued in that room that

a woman could not possibly have understood the mechanics of the thing. It appears in children's books, and it appears in reputable places, and the American Society of Mechanical Engineers has gone through the proceeding and says flatly that it is a myth. What Annan actually argued was that his modifications made his machine a different machine, and that he had made those modifications because he could not perfectly remember the one he had seen.

Which is, if you sit with it for a moment, a confession with a hat on.

On the third of September 1870 the Examiner in Chief awarded priority to Margaret Knight. Her patent issued the following July, number 116,842, and the part of it the document singles out as hers is a small piece called the guide-finger, which holds back the edge of the paper tube during the first fold.

Everything the modern grocery bag is rests on that fold.

She took her invention to Hartford and helped found the Eastern Paper Bag Company, and then she did something that looks like a mistake and may not have been. She took money up front, stock, and royalties, and left the running of the company to other people, so that she could go on inventing.

She went on inventing for another forty years. Skirt protectors, a clasp, a cooking spit, a window sash, numbering machines, shoe-cutting machinery, rotary engines. At least twenty-seven patents. The last one issued after she was dead.

A newspaper found her in 1913, aged seventy-five, working twenty hours a day on what she told them was her eighty-ninth invention.

She died the next year in Framingham, Massachusetts.

The estate came to two hundred and seventy-five dollars and five cents.

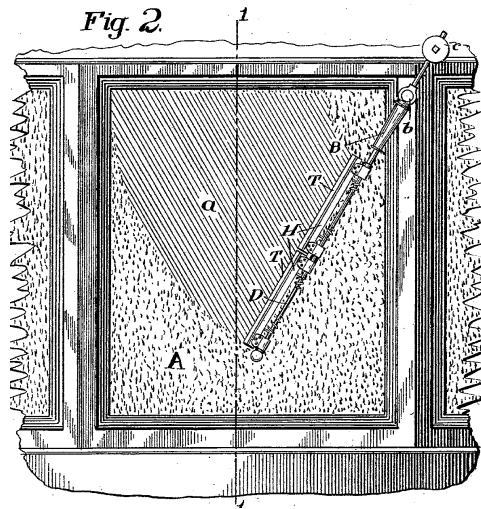
Somewhere around four billion of her bags are made every year, and the fold is still the fold.

THINGS TO TALK ABOUT

- What did you save receipts or paperwork for, and did it ever turn out to matter?
- Who taught you to use a tool?

NEW YORK CITY · 1902

The Letter That Said No



Mary Anderson's "Window-cleaning device," filed June 18, 1903 and granted that November. Figure 2 shows the arm on the outside of the glass, worked by a handle inside.

It was sleeting in New York in the winter of 1902, and the man driving the streetcar could not see.

Every so often he stopped. Then he either leaned out through the open front panel and wiped the glass with his hand, or

he got down off the car entirely and cleared it from the street, and then he climbed back up and drove on until it filled in again.

Everybody on that car watched him do it. It was how winter worked.

One of the passengers was a woman from Birmingham, Alabama, in the city as a visitor, and she took out something to write on and sketched an arm that would swing across the outside of the glass while the driver stayed in his seat and pulled a handle.

Mary Anderson was thirty-six.

She is usually described afterwards as an apartment manager, and she was one, but not yet. In 1902 what she had behind her was five years running a cattle ranch and a vineyard in Fresno, California. She was a woman who had managed property and livestock and payrolls, and she had come home to Alabama, and she was riding a

streetcar in the sleet in another state when she decided the problem was solvable.

She filed the following June. The patent was granted on the tenth of November 1903, number 743,801, and the title on it is **Window-cleaning device**, because in 1903 there was not yet a word for what it was.

The drawing shows a lever inside the vehicle and an arm outside it, carrying rubber-edged pads. A spring holds the arm at even pressure against the curve of the glass. A counterweight brings it back. The whole assembly lifts off, because nobody in 1903 imagined you would want it there in July.

It is, allowing for the hand-crank, the thing on your car.

She tried to sell it. Her great-great-niece, Sara-Scott Wingo, says she approached firms, plural, and one of the replies is the reason we know anything about it at all,

because the family kept it.

In June 1905 a Montreal firm called Dinning and Eckenstein wrote back. They had considered the device, and they had decided against it, and the sentence they used has outlived every other document in the case.

We do not consider it to be of such commercial value as would warrant our undertaking its sale.

Nothing in that letter is about her being a woman. Popular retellings often add that, and the letter does not support it. What the letter says is that in 1905 there were not enough automobiles in the world to be worth the trouble, and on that narrow point, in 1905, the firm was right.

They were about to stop being right very quickly.

The Model T went into mass production in 1913. The patent had seven years left to run. What happened in those seven years is

the part of Mary Anderson's story that nobody has satisfactorily pinned down: some accounts have wipers becoming standard equipment while her patent was still live, and others put it at 1922, which is two years after it lapsed. Cadillac made them standard equipment in 1922, two years after the patent lapsed. The sources contradict each other on everything before that, and none of them shows her being paid.

The patent expired in 1920. She did not renew it and she did not file again.

She went back to Birmingham and looked after the family building, and lived another thirty-three years, and died in 1953 at her summer place in Monteagle, Tennessee, at eighty-seven. She was the oldest member of her church. She never married.

In 2011 the National Inventors Hall of Fame inducted her, fifty-eight years after

her funeral.

There is a thing worth noticing about what she actually did, which is easy to miss because the device is so ordinary now.

She did not invent a way to clean glass. People knew how to clean glass. What she saw, sitting on a streetcar in the sleet watching a man climb down into the road for the fourth time, was that the job could be done from inside, while moving, by someone who was already busy doing something else.

Every windscreen on every road in the world does it her way.

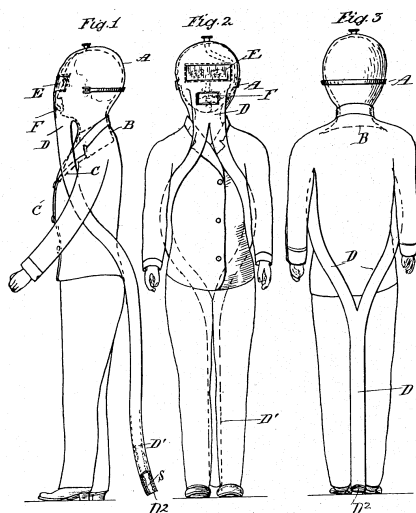
The letter is in the file. Somebody typed it, and signed it, and put it in the post to Alabama.

THINGS TO TALK ABOUT

- What is something you fixed yourself because waiting for somebody else was going to take too long?
- Tell me about the first car in your family. Who was allowed to drive it?

CLEVELAND, OHIO · 1916

The Man Who Came in Pajamas



Garrett Morgan's "Breathing device," filed August 1912 and granted October 13, 1914: the hood on a fireman from the side, the front and the back, with the two air tubes hanging toward the floor.

On the night of the twenty-fourth of July 1916, somebody woke Garrett Morgan up and told him about the tunnel.

Four miles out under Lake Erie, a crew digging Cleveland's water intake had struck

a pocket of natural gas venting from the lake bed, and the gas had gone up, and the tunnel had come down on them. A rescue party went in after them and did not come out. A second rescue party went in after the first and did not come out either.

Morgan got his brother Frank, and four hoods, and went.

The Carnegie Hero Fund's own account of that night says he was barefoot.

What he brought with him was a patent he had been unable to sell. Number 1,113,675, filed in August 1912 and granted in October 1914, and the title on it is **Breathing device**. The specification says what it is for in plain language: to let a fireman walk into a house full of thick suffocating gases and smoke and breathe freely for some time in there.

It is a hood of rubberized cloth with two tubes running down the wearer's body to hang near the floor, because smoke rises

and the cleaner air is at your feet. A sponge soaked in water sits at the intake to cool and filter what comes through. A valve lets the used breath out and nothing back in. There are small trumpets at the ears so the man inside can hear you shouting at him.

He had won first prize with it at a safety exposition in New York.

He had not sold many.

Morgan was thirty-nine that night and he had come a long way to be standing over that shaft. He was born in Paris, Kentucky, in 1877, the son of a father who had been born into slavery. He had six years of school. At fourteen he left home for Cincinnati and worked as a handyman and paid a tutor out of his own wages to keep learning.

His trade was sewing machines. He repaired them, then adjusted them for clothing manufacturers, then opened his own shop on West 6th Street in 1907, and

by 1909 he had a tailoring business with thirty-two people in it making suits and dresses and coats.

That is the man who went down the shaft.

He asked for volunteers. Frank went, and so did Thomas Castleberry, and so did Thomas Clancy, who had already been down once that night and been brought back with a pulmotor after fifteen minutes.

They made four trips. They brought two men out alive, one of them Gus Van Duzen, found face down in the mud and barely breathing, and three or four bodies, the accounts differ. Van Duzen was Clancy's stepfather. Twenty-one men died down there in total. The fumes did something to Morgan's own health that stayed with him for years.

Then the city of Cleveland held an investigation into the disaster and did not call him to it.

Twenty-two people were put forward to the Carnegie Hero Fund for medals. Four received them in 1917. Morgan was not among the four, and the reason the Commission gave in a letter dated the twenty-fourth of January that year is one of the strangest sentences in any of these stories.

While the act by Mr. Morgan is commendable, from the facts at hand it does not appear that it was attended by any extraordinary risk to his own life.

He had been wearing his own invention. The medal is for extraordinary risk. The better the hood worked, the less he qualified.

The Carnegie Hero Fund has since gone back through its own files and says there is no evidence in them that race decided the matter. That is worth reporting accurately, and it does not clear Cleveland. The city did not put his name forward. The city did

not call him as a witness. In 1927 he asked the city council for two thousand dollars for the injuries he took in the tunnel and the council turned him down, while the city manager said out loud that there was a moral obligation.

In 1917 the people of Cleveland, rather than the city of Cleveland, gave him a gold medal with diamonds in it that they had paid for themselves.

He kept going. He patented a traffic signal in 1923 — a hand-cranked semaphore, not the colored light he often gets credited with, and not the first signal in Cleveland either — and sold it, and bought a farm. He founded a newspaper. He ran for city council in 1931 and lost. Glaucoma took his sight by 1943.

He died in 1963, aged eighty-six.

The water plant on Division Avenue in Cleveland has his name on it now. They put it up in 1991, seventy-five years after

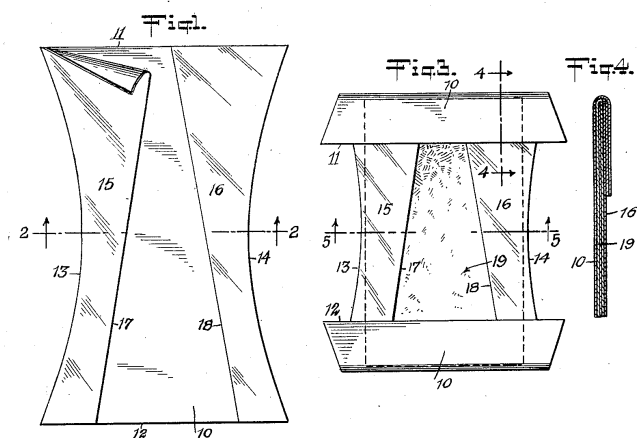
the night somebody knocked on his door.

THINGS TO TALK ABOUT

- Who in your town was the person everybody called when something went badly wrong?
- What did you make or repair for somebody else without being asked?

WESTPORT, CONNECTICUT · 1946

The Shower Curtain in the Bathroom



Marion Donovan's "Diaper wrap," filed January 19, 1949 and granted June 12, 1951. Figure 1 is the wrap laid flat; figure 3 has the diaper in place, in dotted lines.

In 1946 a woman in Westport, Connecticut took her shower curtain down off the rail, carried it to a sewing machine, and cut it up.

Marion Donovan was twenty-nine and had a baby, and she had reached the end of

a particular kind of patience. The cloth diaper of 1946 leaked, and when it leaked it went through to the clothes and then to the sheets, and she changed all three. Her own description of the problem is better than any explanation of it: the cloth, she said, served more as a wick than a sponge.

The alternative on offer was rubber pants, which held the wet in against the skin and gave the baby a rash.

So she made a cover out of the shower curtain. Waterproof, cut to leave the middle of the diaper open so the skin could breathe, and fastened with snaps instead of safety pins, which is the detail that tells you she had been doing this at three in the morning.

She called it the Boater. Her reason, in her own words, was that at the time she thought it looked like a boat.

She was not a housewife who happened to be clever. She had grown up in her

father's machine plant in Indiana, where he and her uncle had invented the South Bend lathe, and she had spent her childhood in a building full of men making things out of metal. Before she married she had been assistant beauty editor at Vogue.

She refined the Boater out of nylon parachute cloth, because in 1946 there was a great deal of surplus parachute cloth and it was waterproof and it was cheap.

Then she went to see the manufacturers.

They said no. What one of them said to her she repeated nearly thirty years later in a television interview, and it is the whole of the problem in nine words.

We don't want it. No woman has asked us for that.

Nobody had asked because nobody had imagined it was available to ask for. That is what the sentence misses and it is a mistake made constantly, in every industry, by people who believe that demand

announces itself in advance.

So she took it to Saks Fifth Avenue herself, and in 1949 Saks put it on the shelf, and could not keep it there. The president of Saks wrote to her afterwards, and the line from his letter has survived: it is not often, he said, that a new innovation in the infants' wear field goes over with the immediate success of your Boaters.

She filed for a patent in January 1949. It was granted in June 1951, number 2,556,800, and the title on it is **Diaper wrap**.

Two years after Saks put it on the shelf, she sold the company and the patent rights to a corporation in Kankakee, Illinois, for a million dollars.

That was 1951. She was thirty-three.

The story is often told with a second act in which she invents the disposable diaper, is laughed at by the paper companies, and then watches Pampers do it a decade later

and make a fortune. The first half of that is roughly right — she did take a disposable concept round the paper companies and was turned down. The second half does not hold up. Disposable diapers already existed in a rough form before she started, and the man who developed Pampers at Procter and Gamble was set on the problem in 1961 by his own dislike of changing his grandchild, and no document has ever connected the two.

She did not need the second act. She had the first one.

What she did next is the part that deserves more attention than it gets. In 1958, with the million dollars in the bank and children at home, Marion Donovan enrolled at the Yale School of Architecture, where she was one of three women in her class, and took the degree.

Then she went on inventing for another forty years. Twenty patents between 1951

and 1996. A facial tissue box. A towel dispenser. A hosiery clasp. A closet organizer. A dental floss she called DentaLoop, patented when she was sixty-eight.

She died in Manhattan in 1998, aged eighty-one.

The Smithsonian has her papers, a hundred and fifty-eight items, and among them are the Boater prototypes, sewn between 1949 and 1956.

The first one is made out of a bathroom curtain.

THINGS TO TALK ABOUT

- What did you make at home because you could not buy one that worked?
- Who in your family could sew, and what did they mend that should have been thrown out?

DALLAS, TEXAS · THE EARLY 1950S

The Secretary Who Painted Over It



The problem arrived with a better typewriter.

For years a typist who hit the wrong key could rub the mistake out. The ink sat on the surface of the paper and a hard eraser would take it off, more or less, if you were careful and the light was bad.

Then IBM brought in the electric typewriter with a carbon-film ribbon, and the carbon did not sit on the paper. It went into it. Erasing it left a gray smear and a hole where the paper had been, and the whole page had to be typed again from the top.

Bette Nesmith Graham typed at the Texas Bank and Trust in Dallas, as executive secretary to the chairman of the board, for about three hundred dollars a month.

She had not planned on any of it. She left high school at seventeen for secretarial school, married her sweetheart at nineteen, had a son at eighteen months into the marriage, and was divorced by twenty-two with a small boy to raise on her own. She took the bank job in 1951 and went back at night for the diploma she had skipped.

She was also a painter, and that is where the answer came from. One winter day the

bank had artists outside painting a Christmas scene on its windows, and she stood on the sidewalk and watched them work.

Watching them, she noticed the thing every painter knows and no typist had thought to apply. Artists do not erase. When a painter puts down a line in the wrong place, the painter puts another layer over the top of it and goes on.

So she mixed white water-based tempera paint, tinted to match the bank's stationery, put it in a bottle, and took it to work with a watercolor brush.

She used it quietly for a while. Then other secretaries noticed the correction that did not look like a correction, and started asking, and she started filling bottles at her kitchen table — nail polish bottles, ketchup bottles, mustard bottles, whatever she had. Her son Michael and his friends filled them at a dollar an hour.

She called it Mistake Out.

She did not patent it. This is the part nearly every retelling gets wrong, and the Patent Office's own account of her is the source that corrects it: the application fee in 1956 was around four hundred dollars, and she did not have four hundred dollars. So she posted herself a registered letter as a rough proof of when the formula existed, and then she protected it the way Coca-Cola protects its syrup, by not telling anybody what was in it.

The bank fired her.

The story of how is almost too neat to be true and appears to be true anyway. Typing a letter on bank stationery, tired, running a company in her evenings, she signed it from the Mistake Out Company.

Being fired was the best thing that happened to the business, which is easy to say from here and was presumably not how it felt driving home.

She renamed it Liquid Paper. She sold it out of her house and then out of a shed and then out of a plant. By the end it was twenty-five million bottles a year, factories in Dallas and Toronto and Brussels, exports to thirty-one countries, and roughly three quarters of a market with thirty companies in it.

In 1979 the Gillette Company bought Liquid Paper from her for forty-seven and a half million dollars, plus a royalty on every bottle sold until the year 2000.

She died the following May, of a stroke, at fifty-six. She had been rich for about six months.

Half of the estate went to charity through two foundations she had set up. The other half went to her son, who by then had spent some years on television as one of the Monkees and was named Michael Nesmith.

There is a temptation to tell this as a story about a fortune, and the fortune is real, and it is the least interesting thing in it.

The interesting thing is a woman on a sidewalk outside a bank in Dallas, watching somebody else paint a window and understanding in one go that the entire office typing profession had been solving the wrong problem for fifty years. They had all been trying to take the mistake off.

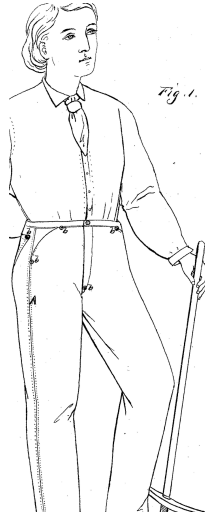
She put something on top of it.

THINGS TO TALK ABOUT

- What did you use to fix a typing mistake, and how well did it actually work?
- Was there something you did at work that nobody had asked you to do?

RENO, NEVADA · 1871

The Rivets on His Workbench



Jacob Davis's patent, granted May 20, 1873 and assigned to Levi Strauss & Company. The one drawing shows the rivets at the corners of the pockets.

The rivets were on the table because of horse blankets.

Jacob Davis kept a tailor's shop on Virginia Street in Reno, Nevada, and in a railroad town in 1871 a tailor did not spend his days on waistcoats. He made

tents. He made wagon covers. He made horse blankets, and horse blankets have straps, and straps tear out of cloth unless something holds them, so there was a box of copper rivets on his workbench.

In the first week of January that year a woman came in and asked for a pair of trousers for her husband.

He could not come himself. He was sick, and by her account he had nothing fit to put on, so she took a piece of string and measured him with it and tied a knot to mark the place, and brought the string to the shop. She wanted to send him up to chop some wood.

What she asked for is in Davis's own sworn testimony, and it is the plainest statement of the problem anybody ever made.

Well the woman asked me to make them strong as he generally tore off his clothes as she says.

She paid three dollars in advance.

Davis had been looking at that problem from the wrong end for years, the way everybody had. Work trousers did not wear out in the middle of the cloth. They failed at the corners of the pockets, where a man's hand went in a hundred times a day and a pocketful of tools hung off two inches of stitching. Reinforce the seam and the seam still pulled. Use heavier thread and the thread still pulled.

He put a copper rivet at each corner of each pocket opening, the way he would have put one on a blanket strap. The straps were not sewn, they were riveted, and when the trousers were finished the rivets were still lying there on the table.

The first pair was white cotton duck. He saw the husband wearing them a few days later, and then the man disappeared.

Then he could not keep up. Men who did not know him were coming in off the

railroad asking for the pants with the metal on them, and Davis understood quickly that if he did not protect the idea, somebody with a bigger shop would simply copy it and he would go back to making tents.

The trouble was the patent fee.

He did not have it. What he had was a fabric supplier in San Francisco he had been buying duck and denim from for years, so in 1872 he wrote them a letter, and one sentence of it is the clearest statement of the whole business anybody ever made.

The secret of them Pents is the Rivits that I put in those Pockets and I found the demand so large that I cannot make them up fast enough.

He offered, if the patent came through, to go to San Francisco or New York to manufacture or represent a factory.

Levi Strauss and Company paid the fee.

The patent was granted on the twentieth of May 1873, number 139,121, and the title on it is **Improvement in fastening pocket-openings**. The inventor named on it is Jacob W. Davis of Reno, county of Washoe, state of Nevada, and the document assigns it to himself and to Levi Strauss and Company jointly, half and half.

Nobody called them jeans. They were waist overalls.

Davis moved his family to San Francisco in the spring of 1873 and ran the manufacturing for Levi Strauss and Company for the rest of his working life. Within nine months of the grant the two of them were in court suing somebody for copying it, asking twenty thousand dollars.

He died in San Francisco in 1908.

There is a detail about the fee that may or may not be true, because nobody has produced the document, and it is repeated often enough to be worth reporting with

the caution attached. Davis is supposed to have said afterwards that his wife cried and begged him not to spend another dollar on inventions, because they needed every dollar he earned.

If he said it, she was right about the money and wrong about the invention, which is a hard way to be wrong.

The half of the patent that went to the man who paid the fee is the half that ended up on the label. That is not theft and Davis did not think it was; he took the deal, he moved west, he ran the factory, and he had work for thirty-five years.

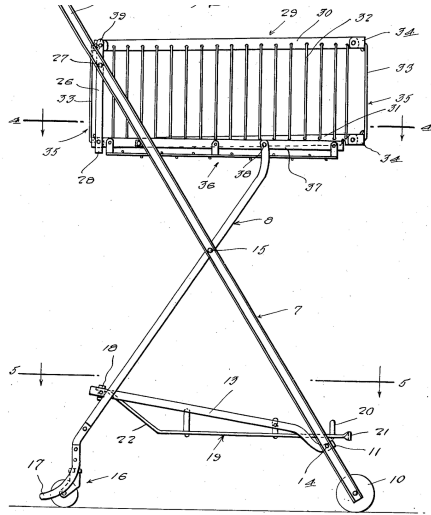
It is only that there are about a billion pairs of trousers in the world with his rivets in them, and his name is not on any of them.

THINGS TO TALK ABOUT

- What piece of your work clothing lasted far longer than it should have?
- Was there somebody in your family who could mend anything?

OKLAHOMA CITY, OKLAHOMA · 1937

Nobody Would Push It



Sylvan Goldman's "Combination basket and carriage," filed May 4, 1937 and granted April 25, 1939. Figure 1 is the cart open for business; figure 3 shows it folded.

The advertisement ran in the Oklahoma City Times on the fourth of June 1937 and it asked a question.

Can you imagine wending your way through a spacious food market without having to carry a cumbersome shopping basket

on your arm?

The man who paid for it was Sylvan Goldman, who owned grocery stores, and what he had noticed about his own customers was not complicated. He had watched them shop with a wire basket over one arm, and he had watched what they did when the basket got heavy.

They stopped shopping.

Not consciously. They simply arrived at the weight they were willing to carry, and then they went to the counter and paid, and everything they might have bought after that point stayed on the shelf.

Goldman put it plainly: if there were some way to give a customer two baskets and still leave one hand free, the store would do considerably more business.

He had the idea in front of him the whole time. A folding wooden chair has a seat and a frame and it collapses flat. Put wheels on the legs, put a second shelf

under the seat, and you have somewhere to set two of the wire baskets he already owned.

He filed for a patent on the fourth of May 1937, a month before the advertisement. It was granted in 1939, number 2,155,896, and the title Goldman chose for it is not modest. It reads **Combination basket and carriage**, and the specification opens by describing an ingenious self-service store-type vehicle.

Then he put them in his stores, and stood back, and watched his customers ignore them completely.

This is the part of the story worth sitting with, because it is the part that almost never gets told about anything. The cart was not rejected because it did not work. It worked perfectly. It was rejected because of what pushing it appeared to say about the person pushing it.

Men would not touch it. A man who could not carry his own groceries out of a shop was advertising something about himself that he had no intention of advertising in front of the neighbors.

Women would not touch it either, and for the opposite reason. A great many of them had spent years pushing a pram, and had only recently stopped, and here was a store asking them to push another one around in public for an hour.

The old people did not want it because they did not want to look like they needed it.

Goldman's answer, as the story is usually told, was theater. He is said to have hired men and women to walk his stores pushing loaded carts and looking entirely ordinary, and to have put a greeter at the door to hand one to every person who came in, so that refusing it became the awkward act rather than accepting it.

That account rests almost entirely on one biography published in 1978 and there is no contemporary document behind it that anyone has produced, so take the scene as likely rather than proven. What is not in doubt is the outcome. Within a few years the carts were everywhere, Goldman was leasing rather than selling them, and he became a rich man on the rental.

He did not stay the inventor of the shopping cart for long.

In 1946 a man named Orla Watson worked out how to make them nest — a hinged back gate that swings up so one cart slides inside the next, which is why a supermarket can keep two hundred of them in the space of six. Goldman filed a competing application and lost. In 1949 he gave up his claim and took a license, and paid Watson a royalty on every cart, and then spent the early 1950s arguing in court about the size of it.

Goldman died in Oklahoma City in 1984, at eighty-six.

One of his early folding carriages is in the Smithsonian.

The store aisle is the width it is because of him. Shelves are spaced for a cart. Checkout lanes are sized for a cart. The reason a grocery trip fills the boot of a car rather than two arms is a man in Oklahoma who looked at a folding chair and then spent a year persuading people that it was not embarrassing to use it.

THINGS TO TALK ABOUT

- What is something new that you refused to try at first and use all the time now?
- Do you recall a grocery store you went to as a child, and what it smelled like?

CORNING, NEW YORK · 1913

The Cake in the Battery Jar



Jesse Littleton brought home a piece of laboratory glass with the top sawn off it and asked his wife to bake a cake in it.

He had been hired the same year, 1913, as the first physicist Corning Glass Works ever employed, brought in from the University of Michigan to a research laboratory the company had only just built. The glass in his hands was a battery jar made of something Corning called Nonex, a borosilicate mixture developed a few years

earlier for railway lantern globes, because an ordinary lantern globe shattered when rain hit it and a borosilicate one did not.

What interested Littleton was not lanterns. It was that glass takes in radiant heat well, and every baking dish in America was made of earthenware or metal, and nobody at Corning sold anything to a kitchen.

Bessie Littleton baked the cake.

It came out evenly cooked all the way through, which a cake in a metal pan often did not. It came out of the dish cleanly. And it baked faster than either of them expected, because the glass was passing the oven's heat into the batter rather than shielding it.

The next morning her husband carried pieces of it into the laboratory and handed them round without saying what it had been baked in, and waited until everyone had agreed it was a good cake before he

told them.

And then she kept going. She tried other recipes and other sizes of glass, including custard cups she made out of the tops of lamp chimneys, and she wrote down how each one came out.

That is one version.

The other version, which is the one usually told, is more satisfying and less well supported. In that one Bessie's ceramic casserole dish shatters in the oven after two uses, she complains about it over dinner, and her husband comes home the following day with the sawn-off jars. The Corning Museum of Glass tells the broken casserole story on its own website, and magazine writers have repeated it, but no archive document has been produced for it, and the museum adds, in its own words, that the truth is more complex and involved many more people and many more experiments.

The honest position is that a physicist who already suspected glass would bake well brought some home, and the person who actually ran the experiment was his wife, in her own oven, on her own time.

She is not on the patent. There is no patent with her name on it anywhere.

The borosilicate patent, number 1,304,623, is titled simply **Glass** and names Eugene Sullivan and William Taylor, the two chemists who had worked out the composition, and assigns it to Corning Glass Works. Jesse Littleton is not on it either.

Nonex could not be sold for food because it contained lead, so the company took the lead out and reformulated it and put the result on sale in 1915 under a name it had trademarked that May.

Pyrex.

They started with pie plates. By 1919 they had sold more than four and a half

million pieces, and within five years of that it was in ordinary kitchens across the country, and the casserole dish your grandmother had and did not replace was one of them.

There is a postscript nobody intends and everybody has in a cupboard. The American Pyrex made now is not the same material. It has been heat-strengthened soda lime glass for several decades, not borosilicate, which is why the old dishes and the new dishes behave differently and why people who own both will tell you so at length.

Jesse Littleton stayed at Corning for forty years and ran its research.

Their son Harvey was born in Corning in 1922 and grew up around the furnaces, and in the 1960s he did something with that upbringing nobody at the company would have predicted: he worked out how to melt glass in a small enough furnace that an

artist could keep one in a studio, and started the American studio glass movement more or less single-handed.

There is a photograph of her in the museum's records, taken around 1910, and another of the three of them together when Harvey was about fifteen. Her birth year is not recorded in any source I could find, and neither is the year she died, and there is not one sentence anywhere in her own words.

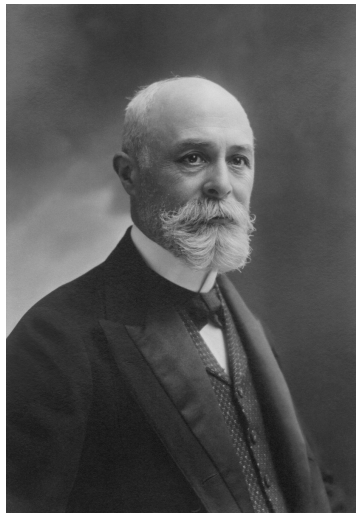
What there is, is her own handwriting on a list of what came out of the oven.

THINGS TO TALK ABOUT

- What dish did somebody in your family always bring, and what did they bring it in?
- What is still in your kitchen that belonged to somebody before you?

PARIS, FRANCE · 1896

The Week the Sun Did Not Come Out



Henri Becquerel, photographed by Paul Nadar. Bibliothèque nationale de France (Gallica), public domain.

Three months after Wilhelm Röntgen wrapped a tube in black cardboard and watched a screen glow across the room, the Académie des Sciences in Paris met to hear about it.

The man who presented Röntgen's results was Henri Poincaré, and he offered a guess about where the new rays came from. The glass wall of Röntgen's tube glowed while it worked. Perhaps the glowing itself was the source. Perhaps anything that glowed after light fell on it might throw off the same penetrating rays.

That was the twentieth of January 1896.

Sitting in that room was a physicist whose father had spent a career on exactly that kind of glowing, and who had inherited his father's collection of the salts that did it.

Henri Becquerel was the third generation of physicists in his family and would not be the last. His grandfather had held the chair before his father, and his own son would hold it after him. He had a set of uranium compounds in his laboratory because his father had worked with them, and he had a reason of his own for

suspecting uranium in particular, out of everything on the shelf, which came from spectroscopic work he had done years before.

His experiment was simple enough to describe in a sentence. Wrap a photographic plate in black paper so no light can reach it. Lay uranium salt on top. Put the whole thing in the sun, so the salt is excited and glows. Then develop the plate and see whether anything has come through the paper.

He did it in late February and it worked. Images appeared. On the twenty-fourth of February he reported it to the Académie under a title that tells you exactly what he thought was happening: on the rays emitted by phosphorescence.

He was wrong, and he was about to find out, and he was going to need bad weather to do it.

He prepared more plates on Wednesday the twenty-sixth and Thursday the twenty-seventh of February. The sun came out only in patches. So he put the prepared apparatus away in a drawer to wait for a clear day.

The clear day did not come.

What happened next he described himself, a few days later, to the Académie, and it is worth having in his own words rather than anybody else's.

Since the sun did not come out in the following days, I developed the photographic plates on the 1st of March, expecting to find the images very weak. Instead the silhouettes appeared with great intensity.

The first of March 1896 was a Sunday. Nobody has ever established why he decided to develop plates that by his own reasoning should have shown almost nothing.

The images were not weak. They were stronger than the ones made in sunlight. The uranium had been sitting in a closed drawer in the dark for three days, excited by nothing at all, throwing something through black paper the entire time.

He understood immediately that the action continued in darkness and set up an experiment to prove it.

What he did not understand, and would not for most of a year, was what he had found.

He went on calling it phosphorescence. In March his papers still had the word in the title. In May he was writing about invisible phosphorescence. He tested other substances that glowed and they gave him nothing, and he tested uranium salts that did not glow at all, and metallic uranium, and every one of them fogged the plate. The effect was not about glowing. It was about uranium.

Only in November did he settle on a name that did not claim to explain it.

Uranic rays.

He published seven papers on it in 1896.

Then Marie Curie took the phenomenon for her thesis, gave it the name radioactivity, and with her husband pulled polonium and radium out of it, and in 1903 the three of them shared the Nobel Prize in Physics, Becquerel's half of the citation reading: for his discovery of spontaneous radioactivity.

In 1901 he carried a sample of radium in his waistcoat pocket and it burned him through the cloth. He wrote it up. Doctors read the write-up and started thinking about what a burn like that might do to a tumour.

He died in 1908, at fifty-five, with sores on his hands.

The unit of radioactivity is named after him. One becquerel is one atom coming

apart per second, which is a very small amount of a very large thing, and it is on every luggage scanner, smoke alarm and hospital chart in the world.

It is there because it was overcast in Paris for a week in February.

THINGS TO TALK ABOUT

- What is something you waited a long time for that was better for the wait?
- What did you keep in a drawer for so long that you forgot what it was?

