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Fast and Fun Activities for *HOW TO BECOME AN ACCIDENTAL GENIUS*

1. If you discovered a star like Williamina Paton Stevens Fleming did, what would you call it and why? (Pages 22–23)

2. Make a list of things that you think an accidental genius would always be sure to carry in a briefcase or knapsack.

3. Sarah E. Goode invented the folding bed. What other furniture could you imagine folding into the wall? Draw a picture of your folding furniture invention. What would you name it? Create an advertisement for your new invention. (Pages 40–43)

4. Do you like to jump on trampolines? Draw what you think a superpowered trampoline of the future could look like and how high you could jump on it. (Pages 60–61)

5. New things are being discovered and invented all the time! If you could invent anything, what would it be and why? (Pages 113–115)



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THE MAID DID IT

Classifying Stars,
1890

**Williamina Paton
Stevens Fleming**

(1857–1911)

Scottish-born Williamina Fleming found work as a housekeeper when her husband left her after they'd moved to Boston, Massachusetts, and before her son was born. Although she was smart and liked science and math, in her day there were few job possibilities for women besides becoming a teacher, seamstress or housekeeper. And single mothers had even fewer choices.

Luckily Fleming found work with Edward Pickering, a professor of astronomy at Harvard and the director of the Harvard College Observatory. Pickering had high standards and demanded excellence, and Fleming was excellent at her job. She was so good, and he was so frustrated with his assistant astronomers, he is reported to have said that his Scottish maid would do a better, more thorough job than his male assistants. Soon thereafter, Pickering hired Williamina Fleming to do just that.



Fleming proved her boss right. She studied, worked carefully and diligently, and **classified** 10,351 stars into 17 categories. She discovered 10 novae, stars whose light suddenly increases and then fades. She discovered 59 gaseous nebulae or dust clouds. She studied long-period **variable stars** and identified 222 of them.

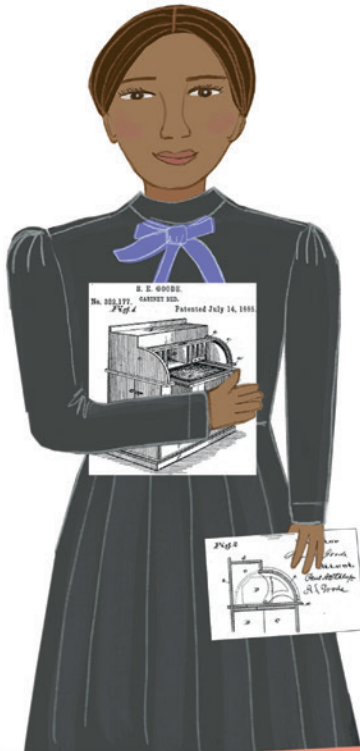
At first her name didn't appear on the published reports of her work, but by 1890 it did. And Fleming continued to hire other smart, science-minded women to become astronomers, many of whom became world famous.

Above: By studying and following the stars, Williamina Fleming (right) and her colleagues helped us understand our universe. Below: In 1888 Fleming recorded the Horsehead nebula (dust clouds in the space between the stars) on a photographic plate at the Harvard College Observatory. Now you can see the nebula, which looks like a horse's head when seen from Earth, through the Hubble Space Telescope.



**"The art and science of asking questions
is the source of all knowledge."**

—Thomas Berger, writer



IT MAKES SENSE

Folding Beds, 1885

Sarah E. Goode

(1855–1905)

AMAZING *and* TRUE

PATENT FIRSTS

Judy Reed, who invented the dough-kneading machine, was the first African American woman to receive a patent, in 1884, and Miriam Benjamin, who invented the hotel chair that could signal a waiter, received the third, in 1888.

How do you cope if your apartment is so small you barely have room for a bed and there's little storage space? That was a problem many people faced, especially in a big city like Chicago, where Sarah Goode and her family lived. Goode knew a lot about furniture. Her father was a carpenter, and her husband, Archie, upholstered chairs and sofas and built stairs. Goode was determined to do something to help their customers with storage and space. She considered three things:

1. The bed had to fold and unfold easily.
2. It had to be strong enough to support the weight of a person.
3. It had to stay in place and not move around.

INVENTION

A Spotlight on Early African-American Inventions

The Cabinet Bed

by Sarah E. Goode

U.S. Patent No. 322,177 • July 14, 1885

This dual purpose space saving furniture could fold into a desk or unfold into a bed.



When folded as a desk a roll-top cover was used to enclose the shelf and cabinet area. Sarah used a pair of metal brackets to pivot and roll the cover in opened and closed positions.



Integrated beneath the shelf area was a sliding writing board, which pulled out for use and slid back when done. The latches on the side of the desk kept the desk from unfolding during use.



To allow the cabinet to unfold Sarah designed two folding parts sitting on a base which were held together with metal arms. In the center of the bed was a spring support. This tray of springs supported the user's back when lying down.



To make handling the folding sections easy Sarah installed a counter-balance system using flexible flat metal rods. This made the sections lighter. The rods were anchored on one end and made to slide freely on the other for opening and closing.

Sarah E. Goode is known as the first African-American woman to be awarded a patent by the United States government. Her Cabinet Bed proudly takes its place among earlier American dual purpose furniture designs. Like others, it's a space saver in the home or office. Unlike others space savers that "hide away", Sarah's Cabinet Bed transforms into a totally different and functional furniture item.

SMITH LENOIR
GRAPHIC CREATIONS



She invented a cabinet with strong **hinged** sections, one on either side, that could be pulled open to reveal a bed. When the bed was folded back up, the cabinet could be used as a desk, complete with space for stationery and other supplies. Goode solved two storage and space problems with just one piece of furniture! On July 14, 1885, she became one of the first African American women to receive a patent for an invention. Sarah Goode's bed became the basis for the Murphy bed, which was patented in 1900 and is still used today.

Left: If Sarah Goode knew how her folding-bed idea influenced later designs, such as the Murphy bed, she would be astonished. Below: Goode is remembered and honored by a school named after her. This academy encourages students to focus on STEM subjects (science, technology, engineering and math).

S. E. GOODE.
CABINET BED.
No. 322,177. Patented July 14, 1885.

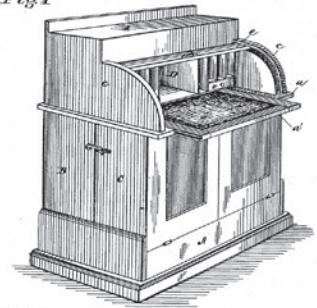
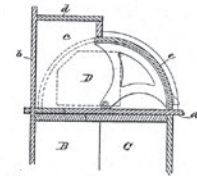


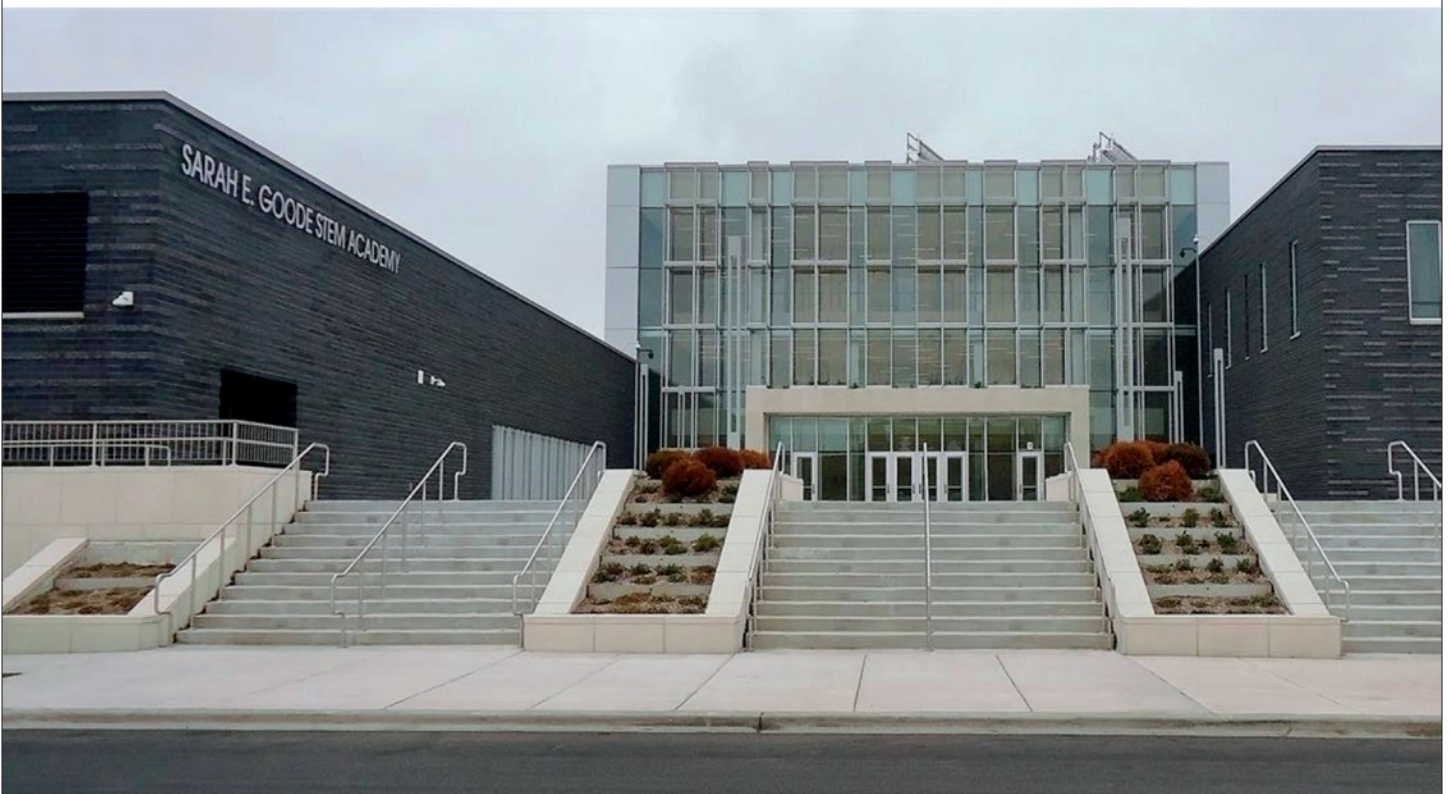
Fig. 1



Attest
Paul Attkins
R. S. Goode

Inventor
Sarah E. Goode

Above: A diagram from Goode's patent for the folding bed.





BOUNCE! BOUNCE! BOUNCE!

Trampolines, 1936

George Nissen

(1914–2010)



Kids—even royal ones!—love jumping on trampolines. Here are Princesses Margarita and Maria Carolina of the Dutch royal family in 1980, playing on this accidental invention.

Trapeze artists fascinated George Nissen. In 1930, when he was just sixteen, he watched a group whirling through the air high above his head at a circus in his hometown in Iowa. But at the end of their routines, the athletes dropped from their swinging bars into the safety net below.

Nissen was a diver and a gymnast at his school. He thought how much more spectacular the show would be if the trapeze artists kept bouncing and flipping on the net.

When Nissen got home, he strapped a canvas sheet to a rectangular frame. But it wasn't very bouncy. Now what? Nissen connected the canvas to the frame using the inner tubes from tires. He called his invention the bouncing rig. Sadly for Nissen, it wasn't very successful.

But he didn't give up. After graduating from college, Nissen and some friends toured the United States and



Mexico, performing on the bouncing rig at fairs and carnivals. While in Mexico, he heard the Spanish word for springboard: *trampolín*. Nissen added an *e* to the end and renamed his invention the trampoline. Success!

During World War II, Nissen's creation was used to help pilots orient themselves in the air. Later, American astronauts and Soviet **cosmonauts** trained on trampolines.

Nissen also invented the game of Spaceball, a combo of basketball and volleyball played on a trampoline. But he dreamed of trampolining becoming an official Olympic sport. For years he wrote to sports officials to plead his case. Nissen's persistence paid off. At the 2000 Summer Olympic Games in Sydney, Australia, eighty-six-year-old Nissen watched proudly as athletes competed on the trampoline for the first time.

Above: Nissen (lower left) demonstrating the game of Spaceball. He always said it was his favorite invention. Below: Trampolines are great for exercising—the springy jumping surface reduces most of the stress on jumpers' joints. They're great for just having fun too!



ALGAE MOBILE

EcoTube,
2008



Param Jaggi

(1994–)

When Param Jaggi was a little boy, he liked to break things to figure out what was inside them. He started with his toys, but when he was five and he broke a computer, his parents were rather upset!

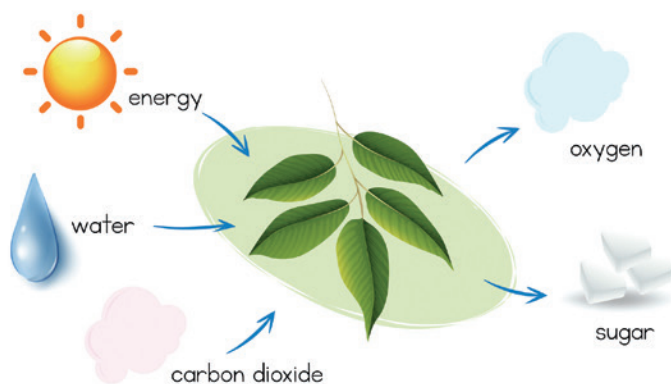
Today Jaggi still likes to break things to look inside them, but he likes to build things too. This amazing inventor was born in Mumbai, India, but grew up in Plano, Texas. He began inventing when he was twelve years old and applied for his first patent a year later. He's fascinated by carbon dioxide, a gas that occurs naturally in Earth's atmosphere. But the amount of this gas has been greatly increased by car exhaust. That's a problem, because it's led to global warming.



When Param Jaggi realized that car exhaust was contributing to climate change, he decided to do something to help save the planet.



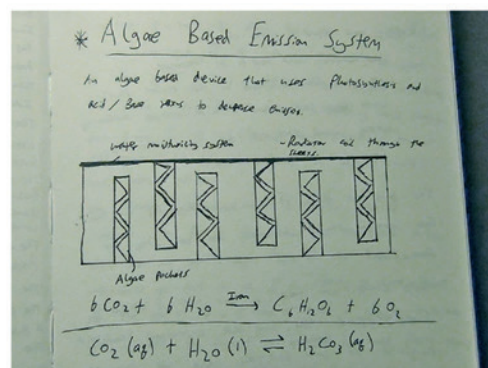
Algae, the green substance you can see on the water here, make most of Earth's oxygen. Some algae look like plants, but they're not plants or animals. Many live in oceans and marshes, but they also live in soil and on leaves, as well as on turtles and even polar bears!



Jaggi wanted to help the environment, so he connected that desire with his knowledge about carbon dioxide and invented the EcoTube. The EcoTube works by passing a car's exhaust fumes through live algae. That makes **photosynthesis** take place, which is the process through which plants absorb sunshine (light), water and carbon dioxide to create sugars they can use as food. Plants release oxygen, which people need to breathe, during the process.

So the EcoTube changes carbon dioxide in a car's exhaust into oxygen and sugar, and that's a lot better for the environment. Jaggi's device can be fitted to a car's tailpipe to reduce carbon emissions by up to 50 percent. He has lots of other ideas for inventions to help the environment and wants to encourage other young people to invent and innovate.

Plants depend on photosynthesis to change light energy, such as sunlight, into chemical energy. A plant can store this chemical energy and use it later for fuel to help it grow.



Here's the EcoTube design that Jaggi first created when he was thirteen. His invention evolved a lot!



The EcoTube fits directly onto the exhaust pipe of any car. It uses basic biological and chemical processes to reduce the car's carbon dioxide emissions.