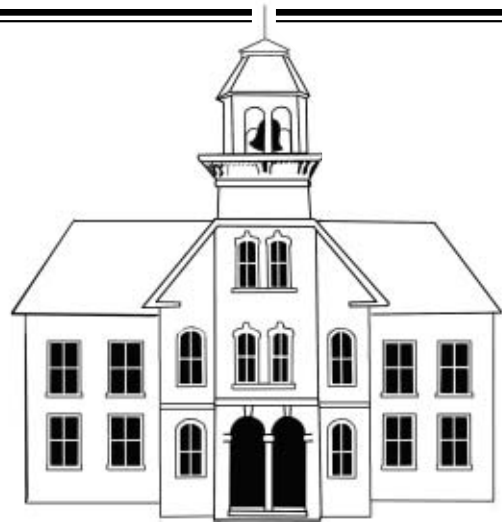
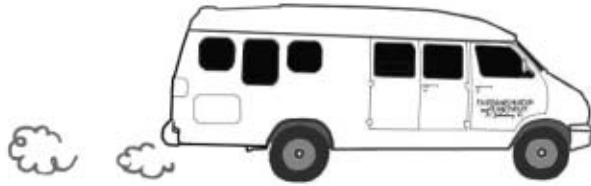


HISTORY *comes to* SCHOOL



Prepared by the staff of the
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Vermont Inventors

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Vermont Inventors

Introduction

Vermont has a long and rich history of inventors and inventions, but unfortunately a definitive work on the subject has never been written. Occasional books have been written about a particular person's achievement such as those books by Gloria May Stoddard, ***Snowflake Bentley*** and ***Henry Leland***, otherwise one must resort to magazine and newspaper articles, or chapters in Vermont and New England history texts to retrieve the broader picture of the subject. This lesson will not fill the void just mentioned but will help to give students a taste of the diversity and creativity of Vermont inventors.

Included in this unit is a section that deals with name recognition as in brand names such as Spaulding sporting goods, Ford car, and Levi jeans, etc. to help the students understand that the initial product's inventor may be long gone but name recognition still draws the buyer and emphasizes the long range success of the "invention."

Goals and Key Concepts

Students will be introduced to the following:

- The need for inventions because of the conditions and restrictions of the early settlers.
- "Necessity is the mother of invention." Is this statement always true?
- The patent process.
- An in-depth look at some Vermont inventors.
- Some other Vermont inventors and their inventions.
- What are "name brands"?

Class Outline

The need for inventions

Students need to be reminded of the conditions and restrictions placed on the early settlers from England. They were to be the providers of raw materials and farm products for the Mother country, ***not*** the manufacturers of goods. It was this repressive policy that held the colonists back and kept any industrial development at bay. This policy was one of the causes of the Revolution. "Double trouble" led to early Vermonters working out ways of making what they needed. This expression came from the situation where they were unable to get tools, machinery and technology from overseas, and also the difficulty of transportation of any but the simplest tools to their new homes.

Local blacksmiths, (Fig. 1), were the "inventors" of untold numbers of gadgets and tools that were needed by the various settlers. Oftentimes a verbal description led to just the right shape and angle of a new tool to fit a need on the farm. Many of these artifacts and patterns have disappeared into history leaving no trace of their existence except in the memories of the designers and the users, and when they die all is lost. Yankee ingenuity was at its best at the blacksmiths' forges of long ago.

"Necessity is the mother of invention." True or false?

More often than not, something is invented because of a particular need. It usually makes our life easier, making the task go faster. Spinning became faster by replacing the hand spindle with the spinning wheel; the steam shovel replaced the hand shovel in construction sites; candle molds replaced walking back and forth with candle rods; the gasoline engine replaced the horse's power. (The students can continue this

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list as an exercise.) There were times when inventors saw into the future far better than the public that surrounded them and without the public seeing a use for the invention at the time, fame and money could not be achieved. Contrast the invention of the platform scale by Thaddeus Fairbanks of St. Johnsbury, VT, with the invention of the electric motor by Thomas Davenport of Williamstown, VT, referred to as the Brandon Blacksmith.

The invention of the platform scale in 1830 would eliminate emptying a wagon of its load before weighing. Wagon and load could be weighed together and the weight of the empty wagon subtracted from the weight of the goods. Much to the surprise of the Fairbanks brothers, this not only caught on in rural Vermont but the United States and the world, this invention would “weigh the world.” Worldwide recognition and money would reward Thaddeus Fairbanks. But in 1834 when Thomas Davenport pieced together the first electric motor his invention fell on deaf ears and bewildered minds. He struggled to show its abilities but the world was far behind Davenport’s vision. His invention did not yield recognition until after his death. Where would we be without it today? You might say that the “necessity” was only seen through the eyes of the inventor.

The Patent process

The government grants a patent to an inventor thereby protecting him or her from others making, copying or selling the invention in the United States. This is the early history of patents. George Washington signed the first Patent Bill in 1790. Patents were issued for “any useful art, manufacture, engine, machine, or device, or any improvement thereon not before known or used.” To apply for a patent, a specification and drawing, and if possible, a model must be presented. Granting patents was placed upon a Board consisting of the Secretary of State, the Secretary of War, and the Attorney General. The Board members had the power to issue a patent for a period of not more than 14 years. The Board fixed the duration of each patent. Originally fees for a patent amounted to between \$4 and \$5 dollars! In 2004 the fees are many times greater than in the early days. In 1802 the Patent Office became a separate part of the Department of State with its first “Chief” and later “Superintendent” leader. On December 15, 1836, the Patent Office was completely destroyed by fire. An estimated loss was 7,000 models, 9,000 drawings and 230 books. All written records were lost.

The first United States Patent was issued in 1790 to **Samuel Hopkins of Pittsford, VT** for a process he developed for making potash out of wood ashes. Potash could be used in glass making and soap making. It is commonly referred to as Vermont’s first cash crop. In 1809, on May 5th, **Mary Kies of Killingly of Windham County, CT**, was the first woman issued a patent. Her invention related to “weaving straw with silk or thread.” First Lady, Dolly Madison praised her for boosting the nation’s hat industry. On March 3, 1849, the Patent Office became part of the newly created Department of the Interior. In April 1926, the Patent Office came under the jurisdiction of the Department of Commerce.

An in-depth look at some Vermont inventors

- **Thaddeus Fairbanks** — inventor of the **platform scale** (Fig. 2) in St. Johnsbury, VT, in 1830. He needed an easier, more accurate way of weighing cartloads of hemp than the steelyard method. He devised a system of levers, which reduced the weight needed to counterbalance a load. This system was placed in a pit to enable wagons to drive onto the platform and be weighed. The result was an invention that was easier (did not have to unload wagon) and more accurate than the steelyard. Thaddeus and his business partner, brother Erastus, thought that possibly they might sell a few as hay scales in surrounding towns. The time was right and not only towns, but states and other countries were demanding this invention. The platform scale earned the right “to weigh the world.”
- **James Hartness** — He was the unusual combination of politician and inventor. Hartness was a former Governor of the State of Vermont but in the 1880’s also the holder of over a hundred different patents. Most of the patents were for machinery used in Springfield, VT. The first **turret lathe** was perhaps his greatest accomplishment. Another of his interests was astronomy, and in this field he invented the **turret equatorial telescope**.

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- **Silas Hawes** — a blacksmith in Shaftsbury, VT, who took in trade some old saw blades for shoeing a horse for a peddler. From the old saw blades in 1814 came the **steel square** (Fig.3), which no good carpenter would be without today. He applied for a patent when the patent office was less than thirty years old. He then took on another blacksmith as a partner and the new steel square business flourished.
- **Lemuel Hedge** — the son of a blacksmith was born in Windsor, VT. Lemuel was more interested in cab-network and the making of machinery. He spent time at the printing office of Thomas Pomroy where he observed the tedious work of ruling paper by hand. As a result in 1815 Hedge patented a process for ruling blank pages called the “**Spring Pen Ruler.**” In 1817 he patented a “**Revolving Ruling Machine.**” The machines were capable of ruling a ream of paper on both sides in twelve minutes. He also was the inventor of the handy, **two-foot folding rule.**
- **James Wilson** — in 1796 he completed the first **inexpensive geographic globe** made in America. This was accomplished in the town of Bradford, VT, by trial and error, without the aid of an instructor, partner, or pattern. In 1813 he established the first geographic globe factory
- **Asahel Hubbard** — of Windsor, VT, invented the “**revolving hydraulic engine.**” It consisted of two meshed gears revolving in a watertight casing. Water was picked up at the bottom of this device and carried around the sides of the casing but prevented from returning by the meshing of the gears and thereby thrust out the top in a steady stream. This was patented on April 28, 1828. The pumps were built with prison labor at the Vermont State Prison in Windsor.
- **Samuel Morey** — of Fairlee, VT, not Robert Fulton, is thought to have invented the first **steamboat**. This boat was operated on the Connecticut River in 1793. Fame and fortune were not to be his and in frustration he sank his boat in the lake that now bears his name. He did have other patents to his credit including, in 1815, the **Revolving Steam Engine.**
- **Thomas Davenport** — a blacksmith of Brandon, VT, was the inventor in 1834 of the **Electric Motor** (Fig. 4). Unfortunately he was ahead of his time and the value of his invention did not reveal itself until after his death. He created and ran the first electrically driven printing press. He died penniless and his genius was not recognized until after his passing.

Listing of other Vermont inventors and their products

- **Elisha Graves Otis** born in 1811, in Halifax, VT, invented the **Otis elevator**. He developed a safety device to keep the elevator from free falling if the cable broke. (Have the students check out the name of the elevators they ride!)
- **Gardner Quincy Colton** born 1814, of Georgia, VT, and **Horace Wells** born 1815, of Hartford, VT, pioneered the use of **Laughing gas** in medical practice as an anesthetic in dentistry.
- **Hiram Kimball** born 1837, of Stockbridge, VT, was the inventor of the **saw for cutting marble.**
- **Joshua C. Stoddard** born in Pawlet, VT, was the inventor of the **steam calliope** and a **horse drawn hay-rake** of which over 100,000 were made. The steam calliope (Fig. 5) is a steam-whistle musical instrument with a loud, shrill sound, audible miles away. It was used to attract attention for circuses, fairs, and arriving steamboats. Stoddard received the patent for this in 1855.
- **Henry Leland** who was the creator of the **Lincoln** and **Cadillac** cars was born in Barton, VT. He did not want either of the cars named after himself
- **Dr. David Millington** born 1773, of Shaftsbury, VT, developed the first **tree grafting wax**. (See the class “**Apples of Vermont**” for information on grafting apples.)
- **Julio Buel** born 1830, of Castleton, VT, invented the first **Fishing Spoon lure**. He got the idea when he accidentally dropped a spoon overboard while fishing and watched a fish strike it.

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- **John Deere** born 1837 in Rutland, VT, was a blacksmith in the Middlebury, VT, area for several years before going out West and inventing the first American **cast steel plowshare**. This plowshare shed dirt more easily and was of great importance to the pioneers settling the Great Plains.
- **Joel A.H. Ellis** of Barnard, VT, was a prolific inventor who invented a **steam excavating-machine**; invented and patented the **splint basket**; was a toy manufacturer that made **toy carts, doll carriages** and the **first jointed dolls**. In all Ellis received 13 patents but some of his best inventions were never patented.
- **Silas Herring** born 1830, of Shrewsbury, VT, was the inventor of the **Herring safe**. To quote advertising from 1865,

"HERRING'S PATENT CHAMPION SAFES
The most reliable protection from fire now known.
HERRING & CO.'S PATENT BANKERS' SAFES,
with Herring & Floyd's Patent Crystallized Iron, the best security against a
burglar's drill ever manufactured."

- **William B. Clapp** of Montgomery, VT, was the first person to **can meat** in this country.
- **William Chandler** born 1821, of Randolph, VT, was the inventor and operator of the **first refrigerator car** on the railroad.
- **Charles Hood** of Chelsea, VT was the originator of **Hood's Sarsaparilla**. This was a sweetened, carbonated beverage flavored with birch oil and sassafras. A popular soda fountain drink before the days of Coke and Pepsi.
- **Wilson A. Bentley** 1865-1923, of Jericho, VT, was a **photographer of snow crystals**. These beautiful images showed the individual design of snowflakes and became the designs used for ornaments, jewelry and patterns in knitting.
- **George Hubbard** of Windsor, VT, and nephew of Asahel, manufactured **coffee percolators**.
- **Charles Orvis** of Manchester, VT, invented the first **Ventilated Fly Fishing Reel**. The company that he founded in 1856, still exists today.
- **A. J. Fullam** developed an **instrument for shearing sheep**. These clippers were later adapted for clipping horses and even for clipping the bob style haircuts of the "flappers."

Not only blacksmiths but also gunsmiths were inventors. Here is some rich history out of the Windsor area.

- **Nicanor Kendall** developed an **Under-hammer rifle** that was said to have been one of the safest, simplest and most dependable sporting arms ever devised. An interesting side note was that this rifle came about as a result of a "near miss" with his girlfriend in a sleigh. He grabbed for a rifle, which fired before he wanted it to, sending a bullet through the hair of his lady friend!
- **Richard Smith Lawrence** and **Samuel Robbins** of the Robbins and Lawrence Company were the originators of the "**Interchangeable U.S. Army rifle**" of which the individual parts were mass produced and interchangeable and not custom made as in previous models.
- **Daniel Baird Wesson** and **Richard Lawrence** in 1850 developed the **Robbins & Lawrence revolving pistol**.

Any student interested in Vermont's rich gunsmith history can refer to **Vermont's Gunsmiths & Gun Makers to 1900** by Harry Phillips & Terry Tyler.

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And finally, to round out this partial list of inventors here's just plain Smith!

- **David M. Smith**, born 1806, inventor of a **combination lock**, **first lathe dog**, **clothespin**, **blanket hook & eye** (used heavily in the Army & Navy), **corn-planter**, **a broom holder**, **lift spring for match-boxes**, **adding machine** and **joint for carpenter's rule** just to name a few.

Name brands

More often than not, what you wear, drive or ride in, eat, use as a form of recreation, or as a household gadget, etc. is "branded" with the name of an individual. Long before corporations, mergers and franchises, there were businesses founded on family inventions. Today, these individuals may be long gone but the name recognition remains with the item. New owners would be taking a great risk to change a name that generations have grown up with. **Levi** jeans, **Spaulding** baseball gloves, **Campbell** soups, **Ford** cars & trucks, **Singer** sewing machines, **Gillette** razors are examples of the name brands that historically go back to individual inventors such as **Levi Strauss**, **Albert Spaulding**, **Joseph Campbell**, **Henry Ford**, **Isaac Singer** and **King Gillette**. Gone too, are **Thaddeus Fairbanks**, **John Deere**, **Elisha Otis** and **Charles Orvis** but their names are recognized in scales, tractors, elevators and fishing gear.

You may have an individual story of your own that brings this home to the students. Mine was the first time I wanted to bake a cake from scratch and needed baking chocolate. I stood in front of the store aisle looking at the choices and my eyes fell on **Baker's Chocolate**, something I had seen in my mother's cupboard so I bought it! By the way, **Baker's Chocolate** is the oldest brand name in America. Although the company has changed hands many times the name remains the same.

Follow-up Activities

1. Choose and research a Vermont inventor. Prepare a paper, drawing, or model of their invention.
2. Have an Inventors' Fair where each student or pair of students comes up with their own invention and the need it addresses. A model must be made and demonstrated.
3. Set up a Patent Board to judge the patents applied for by the students. Have them evaluate the uniqueness of the invention, how it would be used, and whether it qualifies for a patent.
4. Have students pick a "brand name" originating with an individual inventor and research the history of the company and where it stands now. Two interesting examples in 2004 would be Eastman Kodak and Levi Strauss as they have been recently hit with hard economic times.
5. Draw a map of Vermont and see if you can find an inventor for every county.
6. Visit the Fairbanks Museum and request the class on Vermont Inventors.
7. You may know some inventors. Invite them to your class for a presentation on their inventions and the inspiration for them.
8. Write The United States Patent and Trademark Office for educational materials.

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Resources

Books: Those with * are children's books

*Snowflake Bentley. Martin, Jacqueline Briggs, Azarian, Mary, ill. Houghton Mifflin Company. Boston, MA. 1998.

Henry Leland: The story of the Vermonter who created Cadillac and Lincoln. Stoddard, Gloria May. New England Press. Shelburne, VT. 1986.

Patently Female. Vare, Ethlie Ann & Ptacek, Greg. John Wiley & Sons, Inc. New York, NY. 2002.

Precision Valley. Broehl, Wayne G. Jr. Prentice -Hall, Inc. Englewood Cliffs, NJ. 1959.

Snowflake Bentley, Man of Science, Man of God. Stoddard, Gloria May. New England Press. Shelburne, VT. 1979.

The Branding of America. Hambleton, Ronald. Yankee Books. Dublin, NH. 1987.

The Inventive Yankee. Yankee Books. Dublin, NH. 1989.

The Smithsonian Book of Invention. Smithsonian Exposition Books, W.W. Norton & Company. New York, NY. 1978.

The Snowflake Man, A Biography of Wilson A. Bentley. Blanchard, Duncan C. McDonald & Woodward Publishing Company. Blacksburg, VA. 1998.

The Vermont of Today - Volume I. Stone, Arthur F. Lewis Historical Publishing Company, Inc. New York, NY. 1929.

Thomas Davenport. Davenport, Walter Rice, D.D. Vermont Historical Society. 1929.

Vermont Firsts Collection. Mitchell, Bruce, artist. First Vermont Bank. Brattleboro, VT. 1977.

Vermont Inventors, the Unsung Heroes. Essex Middle School, Essex Town Supervisory District. Essex, VT. 1982. (I found this in a Regional Library)

Vermont's Gunsmiths & Gun makers to 1900. Phillips, Harry and Tyler, Terry. Two Damn Yankees Inc. Dorset, VT. 2000.

Vermonters. Kent, Dorman. Vermont Historical Society. 1937.

Women Invent. Casey, Susan. Chicago Review Press. Chicago, IL. 1997.

Other sources could include issues of *Vermont Life*. Check the index on line. www.vtlife.com

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Vermont Standards

This class is associated with the following standards: 4.6c; 6.4; 6.4c

Human Diversity

Understanding Place

4.6 Students demonstrate understanding of the relationship between their local environment and community heritage and how each shapes their lives.

4.6.c. Demonstrate knowledge of past and present community heritage (e.g., traditions, livelihoods, customs, stories, changing demographics, land use) and recognize ways in which this heritage influences their lives.

History

Historical Connections

6.4 Students identify major historical eras and analyze periods of transition in various times in their local community, in Vermont, in the United States, and in various locations world wide, to interpret the influence of the past on the present.

6.4.c. Investigate the impact of new knowledge and inventions (e.g., the knowledge of fire, the printing press, the cotton gin, train, automobile, textile, machine, electricity, steam).