THOMAS ALVA EDISON'S ASSOCIATE

LEWIS HOWARD LATIMER

A BLACK INVENTOR

A BIOGRAPHY AND
RELATED EXPERIMENTS YOU CAN DO

HOPE

"The two fortresses which are the last to yield in the human heart, are hope and pride."

"Hope springs eternal in the human breast," and is as necessary to life as the act of breathing.

For who would live if life held no allurements?

There must be vistas flying out beyond, that promise more than present conditions yield.

Tomorrow may be fair, however stormy the sky of today.

Some blessings have been ours in the past, and these may be repeated or even multiplied.

We create our future, by well improving present opportunities; however few and small they be.

Habit is a powerful means of advancement, and the habit of eternal vigilance and diligence, rarely fails to bring a substantial reward.

Add to this the pride of achievement; the desire to rank among the successful souls on earth, and we have the factors which have brought some of the ablest of human beings into the limelight that revealed them to an admiring world, as leaders and examples.

L. H. Latimer

INTO THE SECOND CENTURY OF LIGHT

A PUBLICATION OF THE
THOMAS ALVA EDISON FOUNDATION
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ADVANCING SCIENCE, TECHNOLOGY AND ENGINEERING EDUCATION

THOMAS ALVA EDISON'S ASSOCIATE

Lewis Howard Latimer

A BLACK INVENTOR

■

A Biography and Related Experiments You Can Do

Produced with the support of the
GENERAL ELECTRIC COMPANY
and the cooperation of the
GREENFIELD VILLAGE and HENRY FORD MUSEUM

TO THE YOUNG PEOPLE OF AMERICA

A successful struggle against great odds is the most stirring of human dramas. Such was the life and career of Lewis H. Latimer, a black man important in the development of this nation's electrical industry.

Mr. Latimer was an inventor, patent authority, poet, draftsman, author and musician whose thirst for knowledge and determination to succeed carried him from humble beginnings as the son of a runaway slave to become one of the original Edison Pioneers – a group of Thomas Edison associates and fellow inventors who brought light to the world through electricity.

This booklet briefly tells of Latimer's struggle and achievements. And, through trying the simple experiments included, based on Latimer's inventions, any American youngster can learn more about the value of this great man's contributions.

Today our nation sorely needs technically oriented young men and women – especially young minority men and women – with the kind of imagination, courage and the determination to succeed that enabled Latimer to conquer difficult technical fields in the volatile reconstruction period after the Civil War. His life is a demonstration of what is possible in America despite the imperfections of our society. And, in fact, Lewis Latimer is worthy of emulation by all American youth.

There are many ways to determine if your interests and skills lie in engineering, science or a related technical field. One way is to work the experiments inside. If you enjoy doing them, perhaps you should look deeper into these fields and learn about the many opportunities waiting for those who properly prepare themselves.

There is a need. There is an opportunity. There is ample reward for all who pursue such training. You, too, can climb to the top of a technical profession.

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A Biography of

LEWIS HOWARD LATIMER

A Model for Today's Youth

The story of Lewis Howard Latimer is the story of a self-made man . . . a black man. He was the son of a runaway slave. Yet from that humble beginning, he rose to become one of the early builders of the electric light industry.

While helping to shape this industry, Latimer worked at several companies and with a lot of important people. At one time, he was an associate of Thomas Alva Edison. In fact, he belonged to the original "Edison Pioneers," a select group of Edison's fellow inventors and friends.

Because of his varied interests and desires, Latimer grew in many ways. He was an inventor, a patent expert, a draftsman, an engineer, an author, a poet, and a musician. In addition, he was a patriot, a devoted family man, an organizer, and an active member of many "do good" organizations.

As you can see then, Lewis H. Latimer deserves a great deal of credit and respect. And he also deserves more attention from all of us who live better as a result of what he and his associates contributed to the modern world.

This outstanding man had the courage to dream an ambitious dream and make it come true. His accomplishments, although little known, prove that a determined person can make good no matter what the odds are against him or her.

Photographs and biographical data assistance provided by Lewis Latimer's grandchildren, Miss Winifred L. Norman and Gerald Latimer Norman.

As a Boy

Lewis Howard Latimer was born in Chelsea, Massachusetts on September 4, 1848. He was the fourth child of George and Rebecca Latimer.

His father, George, who had been a slave, fled to Boston from a plantation in Norfolk, Virginia in 1842. George's flight to freedom, by the way, formed the basis of a poetic story called "Massachusetts to Virginia," written by John Greenleaf Whittier. When George's "owner" found him and tried to return him to slavery, the local citizens became very aroused. As a result, they collected and paid the $400 needed to buy George's freedom.

As a free man, George worked as a barber and paperhanger. But he earned very little money. The best he could provide his four children was a few years of grammar school learning.

Young Lewis, despite limited opportunities for education, became quite interested in reading, writing stories, and drawing. He wanted to get a good education. But he also knew the family needed help. So at the age of 10, Lewis began working with his father at night hanging wallpaper. Later, he got a job as an office boy for Isaac Hull Wright, a famous Boston lawyer.

Lewis naturally had bitter feelings about slavery. At the age of 16 he joined the United States Navy, to fight against slavery during the Civil War. He served as a "landsman" on the sidewheel gunboat "U.S.S. Massasoit" until the war ended in 1865.

The Start of His Career

Returning home, Lewis obtained a job as a helper in the office of Crosby and Gould. This was a well-known firm of patent lawyers in Boston. It was here that Lewis' earlier interest in drawing began to blossom. In his spare time he taught himself the principles of drafting (mechanical drawing). Noting this new ability, the company made him a draftsman.

Lewis wasted no time in working and studying to move ahead. Shortly after that he was named chief draftsman of the company. In this position he prepared drawings of inventions that went to the U.S. Patent Office in Washington, D.C. As a matter of fact, he made the initial drawings and assisted with the preparation of the patent application for Alexander Graham Bell's telephone.

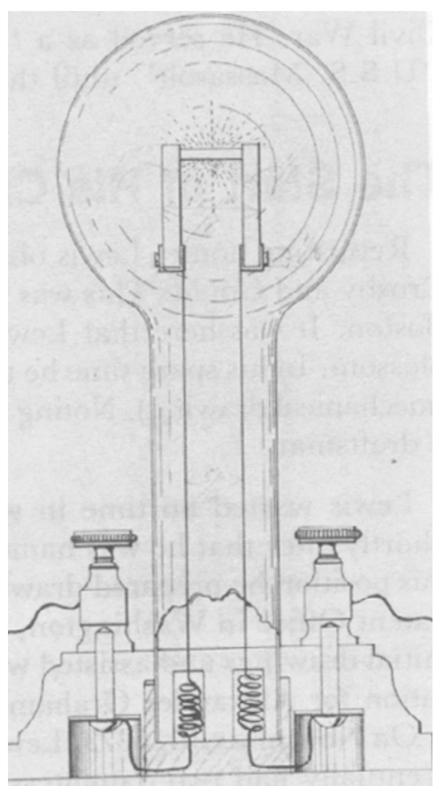
On November 10, 1873, Lewis Latimer married Mary Wilson. They eventually had two daughters, Jeanette and Louise.

The Years with Maxim

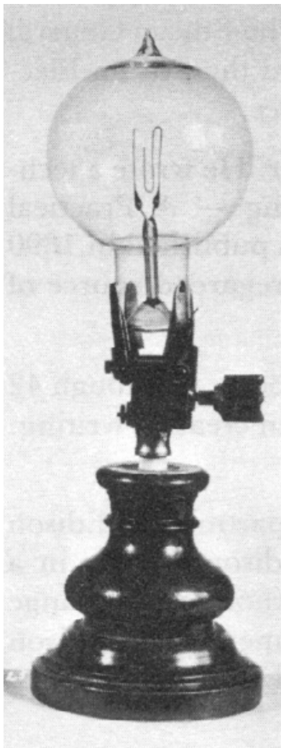
By 1874, Latimer had worked on many mechanical inventions, and his creative ideas were starting to become known. One of those impressed with Latimer was Hiram S. Maxim. Maxim was an inventor and founder of the United States Electric Lighting Company in Bridgeport, Connecticut. In 1880 Maxim invited Latimer to join his company. Latimer accepted.

While there, Latimer invented and patented a process for making carbon filaments for light bulbs. He taught the process to company workers, and soon it was being used in factory production. Latimer also assisted in installing Maxim lighting systems in New York City, Philadelphia, Montreal, and London.

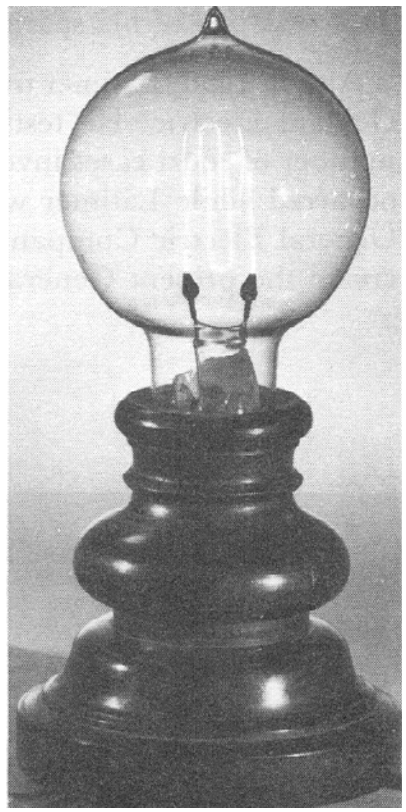
During the installation of lighting in Montreal, where a lot of people spoke only French, Latimer learned the language in order to competently instruct the workers. In London, he set up the first lamp factory for the Maxim-Weston Electric Light Company. That required him to teach the workmen all the processes for making Maxim lamps, including glassblowing. In a brief nine months, Latimer had the factory in full production.



First drawing done by Lewis H. latimer for Hiram S. Maxim in 1880 in Bridgeport, Connecticut. It is a drawing of an early Maxim lamp.



Maxim-Latimer lamp produced in 1882 with Latimer switch and socket. This lamp is part of the collection by William T. Hammer, and Edison Pioneer, at the Edison Institute in Dearborn, Michigan.



Original lamp with carbon filament invented by Lewis H Latimer in 1882 (U.S. Patent 252, 386). This lamp is also part of the Hammer collection.

The Years with Edison

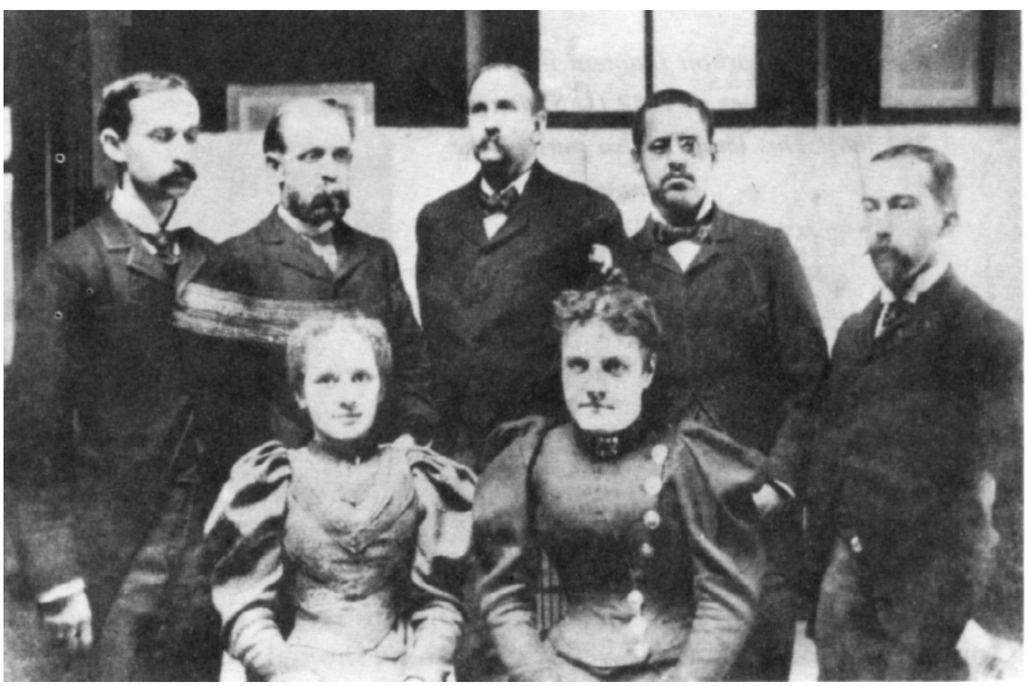
Upon his return to America in 1882, Latimer left Maxim for more challenging jobs. First he worked for the Olmstead Electric Lighting Company in Brooklyn, New York. Then he moved to the Acme Electric Light Company in New York City. Finally, in 1884, he joined the Edison Electric Light Company. It was also located in New York and was the headquarters of several firms founded by Thomas Edison. Latimer was named draftsman-engineer.

After coming to Edison Electric, Latimer saw many important changes take place. One of these was formation of the Edison General Electric Company in 1889. This new firm included the Edison Electric Light Company and several related companies.

Latimer had become an expert electrical engineer. He wrote a technical book called, “Incandescent Electric Lighting — A Practical Description of the Edison System.” The book was published in 1890 as a general guide for engineers. It was a highly regarded source of information.

That same year, Latimer completed a book of poetry. Although 42 years old, he had never lost his childhood interest in creative writing. This was one of his spare-time pleasures.

Also in 1890, Latimer transferrd to the Legal Department of Edison General Electric. He testified as an expert on Edison patents in a number of court cases involving patent lawsuits. Another big change occurred while Latimer was in the Legal Department. The Edison General Electric Company merged with a second firm, in 1892. to create the present General Electric Company.



Lewis H. Latimer (back row second from right) in legal office of the General Electric Company, 44 Brood Street, New York City, where he was employed in 1894.

After Edison

In 1896, the General Electric Company and Westinghouse Corporation jointly set up a group known as the Board of Patent Control. Latimer served as full-time patent consultant until the group broke up in 1911.

Entering the final stage of his career, Latimer then became a consultant for a New York engineering and patent law firm operated by Edwin W. Hammer. He remained there until his retirement in 1924 at the age of 75.

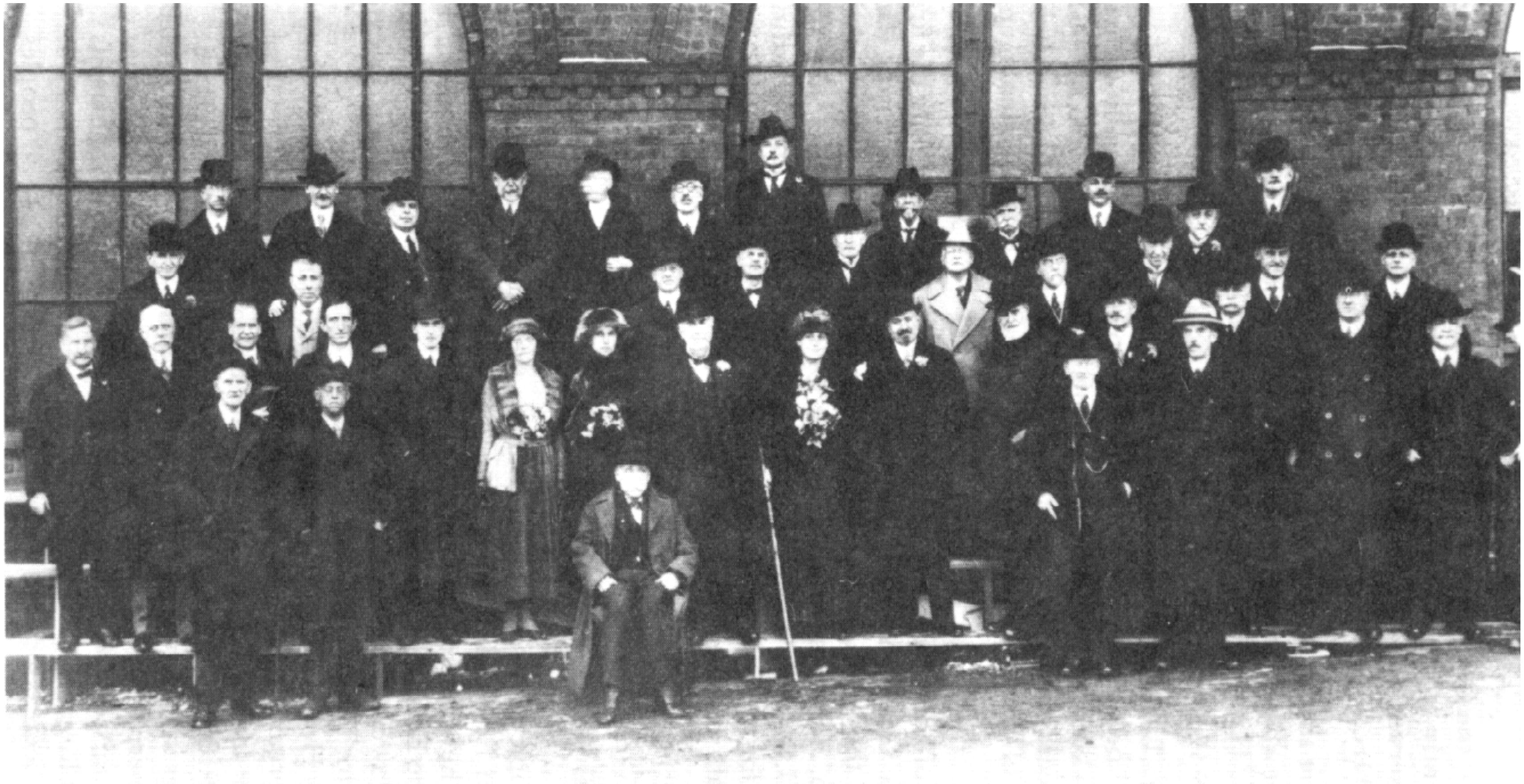
During Latimer's employment with Hammer, the "Edison Pioneers" organization got started. The group was officially formed in 1918 to keep alive the ideals and aims of Edison who died in 1931. The pioneers originally consisted of 28 dedicated men who had been associates of Edison before 1885. Latimer was one of the original members.

A man of honor, loyalty, and goodwill, Latimer was among the first to join the Grand Army of the Republic, a society of veterans who fought for the North in the Civil War. Its purposes were to strengthen fellowship, honor the war dead, care for their dependents, and uphold the U.S. Constitution. Latimer acted as Adjutant and recording secretary for the George Huntsman Post in Flushing, New York, until his death on December 11, 1928 at the age of 80.

Tribute to A Great Man

Few people have served their country, their family, and their profession as did Lewis Howard Latimer. As a lasting tribute to this man and what he achieved, the entry below appears in the permanent records of the Edison Pioneers. The entry was made in 1928 by William H. Meadowcroft, historian for the group and long-time private secretary to Thomas Edison:

> "Lewis Howard Latimer was of the colored race, the only one in our organization, and was one of those to respond to the initial call that led to the formation of the Edison Pioneers, January 24th, 1918. Broadmindedness, versatility in the accomplishment of things intellectual and cultural, a linguist, a devoted husband and father, all were characteristic of him, and his genial presence will be missed from our gatherings We hardly mourn his inevitable going so much as we rejoice in pleasant memory at having been associated with him in a great work for all peoples under a great man."



Third annual meeting of the "Edison Pioneers." February II, 1920 at the Edison Laboratory, West Orange, New Jersey. Lewis H. Latimer is second from left, front row. Mr. and Mrs. Thomas A. Edison appear in the front row, center.

Experiments Related to Latimer's Work

A FEW THINGS YOU SHOULD KNOW ABOUT ELECTRICITY . . .

An **electric current** is the flow of tiny particles called **electrons.** As a rule, electrons can only travel through certain materials . . . these are called conductors. Most metals are good conductors; copper is especially good. You will use copper wire to perform the electrical experiments we'll talk about later.

A circuit is a group of electrical devices (light bulbs and switches, for example) that are connected in such a way that an electric current can flow through the various parts. It is nothing more than a path for current to follow.

An electric current doesn't happen by itself. Electrons must be pushed through a circuit. In our experiments, this job is done by a 6-volt battery. The "6-volt" label tells us how strong a push the battery can give the electrons.

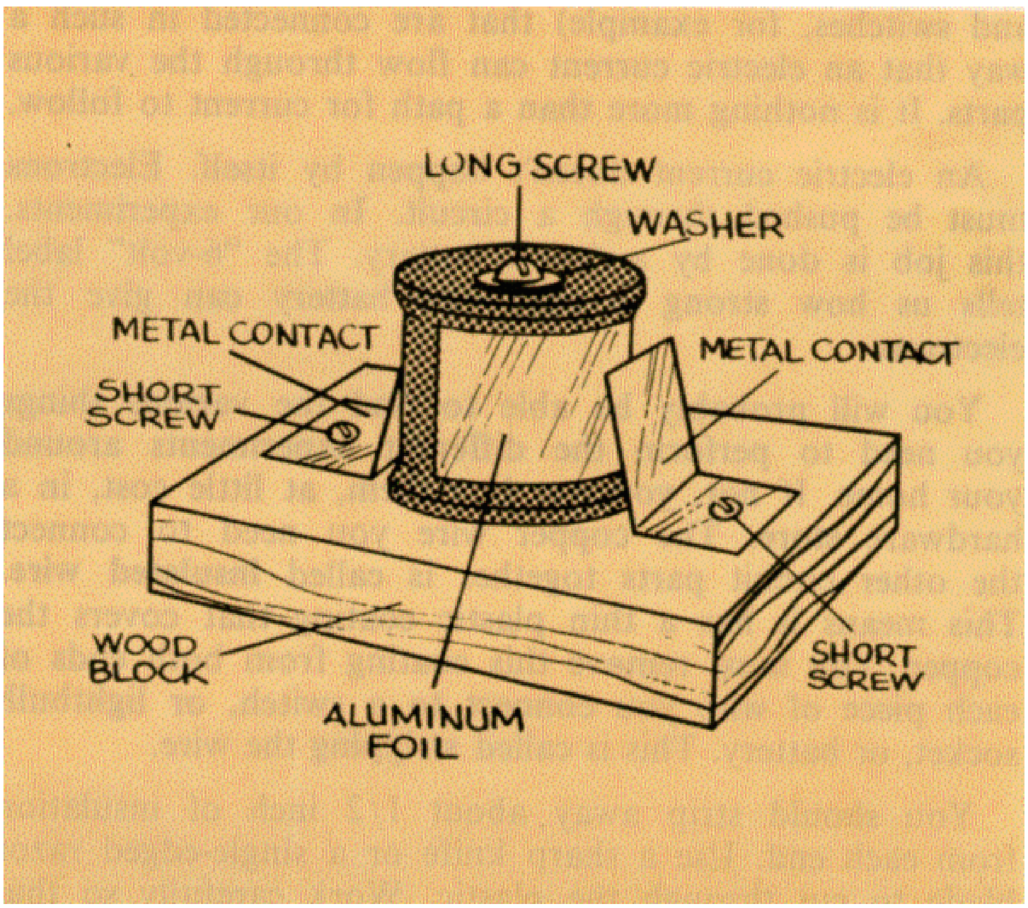
You will probably be able to find the various things you need to perform the different experiments around your home. If not, you can buy them, at little cost, in a hardware store. The copper wire you need to connect the other circuit parts together is called **insulated wire.** This means it has a thin plastic coating that covers the copper. You must remove this coating from both ends of each piece of wire you connect to a switch, or lightbulb socket, or battery. This is called **stripping** the wire.

You should strip away about 1/2 inch of insulation from each end. Use a sharp knife or a single-edged razor blade to cut through the plastic. Work carefully so that you don't cut your fingers, and try not to nick or cut the copper wire.

Now that you understand the basics, let's go on to the experiments . . .

EXPERIMENT 1: Build a Switch

THINGS YOU NEED: Empty thread spool. Small piece of aluminum foil. Old tin can. Two small wood screws. One long wood screw. Two metal washers. Piece of wood about 2 inches square. 6-volt lantern battery. 6-volt lantern flashlight bulb. Small socket for the bulb. Some insulated wire.



Lewis Latimer once invented a switch that was meant to control an electric light bulb. The switch mechanism was a bit unusual: When the knob was turned, a metal pin came between two metal strips to complete the circuit (see the sketch).

You can build a switch that works in much the same way . . . and use it in the electrical experiments that we'll talk about later. Since you will need three switches for the parallel circuit experiment, gather together enough material to build three switches before you begin.

Our switch does not use a metal pin. Instead, a metal foil surface on its "knob" comes between two metal contact strips to complete the circuit. Here's how to build it:

Use an empty thread spool as the knob. As shown in the drawing, glue a small piece of aluminum foil between the two end flanges. The piece of foil should run a little over halfway around the spool.

This is important: Apply cement all over the back of the piece of foil so that all of the foil is held tightly against the wooden surface. The foil must fit smoothly in place with no bubbles or tears.

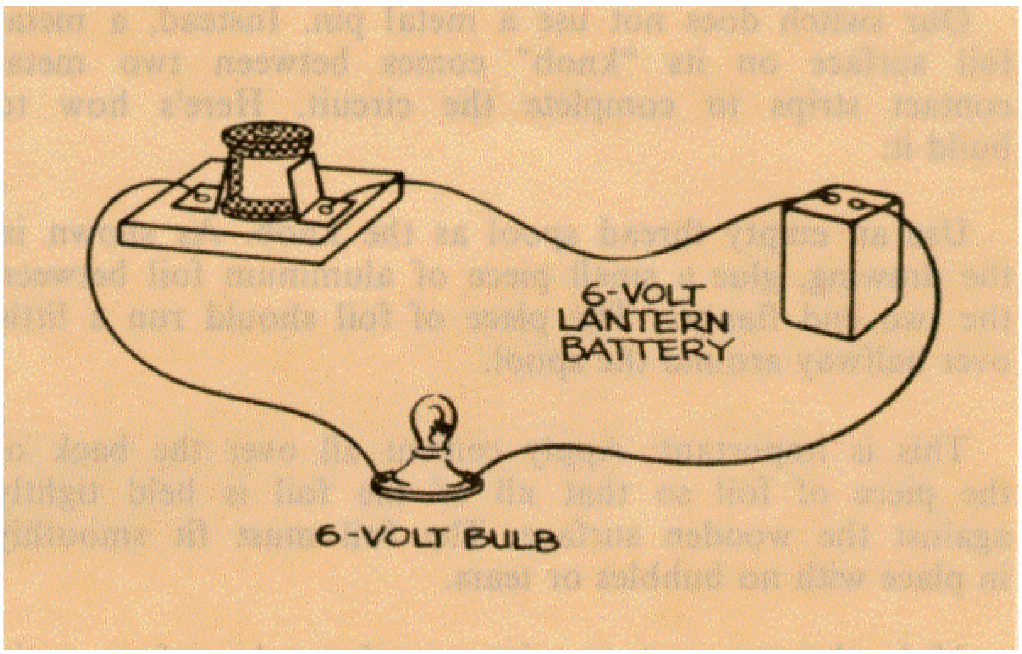
Make the two contact strips out of metal cut from a tin can. Clean the can thoroughly, then remove both ends. Next, cut the can open lengthwise with tin snips and press it flat. The cut edges will be sharp, so work carefully.

Each contact strip 'should measure about 1/2 inch by 1 inch. Bend each strip into an "L" — each leg of the "L" should be about 1/2 inch long.

The switch's base is a piece of wood about 2 inches square. Mount the knob on the center of the base with a long wood screw. Place a washer at the top and bottom of the spool. Tighten the screw just enough so that the knob can't jiggle around but will still turn freely.

Mount the contact strips on the base with short wood screws. The upward-pointing legs of the "Ls" should press gently against the spool like bookends against a book. The top of each leg should press gently against the spool's middle.

Observe the action of the switch. As you rotate the knob, the metal foil comes in contact with both contacts . . . at this point the switch is "on."



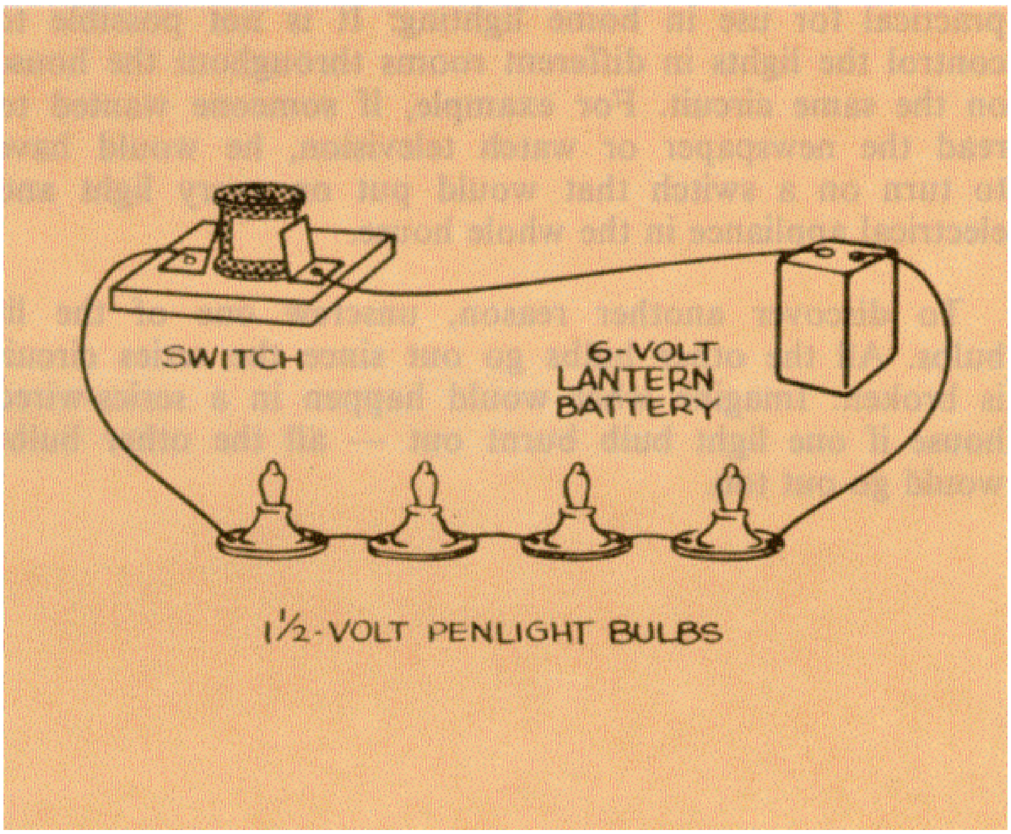
Turn the knob further, and the foil moves past one of the contacts to break the circuit . . . the switch is "off."

To connect the switch to other. components, simply loop the interconnecting wires underneath the screws that hold the contacts in place.

Just about the simplest possible electric circuit is shown in the second diagram. It consists of a switch, a lightbulb (held in a socket), and a battery. Observe how the switch controls the current flowing through the circuit and turns the light on and off.

EXPERIMENT 2: A Series Circuit

THINGS YOU NEED: Homemade switch (from Experiment 1). Four 1½-volt penlight bulbs. Four small sockets. 6-volt lantern battery. Some insulated wire.



A series circuit looks like a loop. The same electric current flows through all of the parts of the circuit, sort of like a toy train running around a single, closed track.

Nearly 100 years ago, during the early days of electric lighting, a few experimenters proposed that house lights be wired using series circuits. For a while, Lewis Latimer was an assistant to one of these men. The idea worked . . . but not very well. Latimer's later work focused on parallel circuits. To see why, let's build a series circuit:

You'll need a switch, four 1½-volt penlight bulbs, a few pieces of wire, and a 6-volt battery. Connect the wires as shown in the diagram.

When you turn the switch on, the four bulbs light up together; when you turn the switch off, the four bulbs go out together. It is impossible to control the bulbs individually. This is one reason that series circuits are not practical for use in home lighting: It is not possible to control the lights in different rooms throughout the house on the same circuit. For example, if someone wanted to read the newspaper or watch television, he would have to turn on a switch that would put on every light and electrical appliance in the whole house.

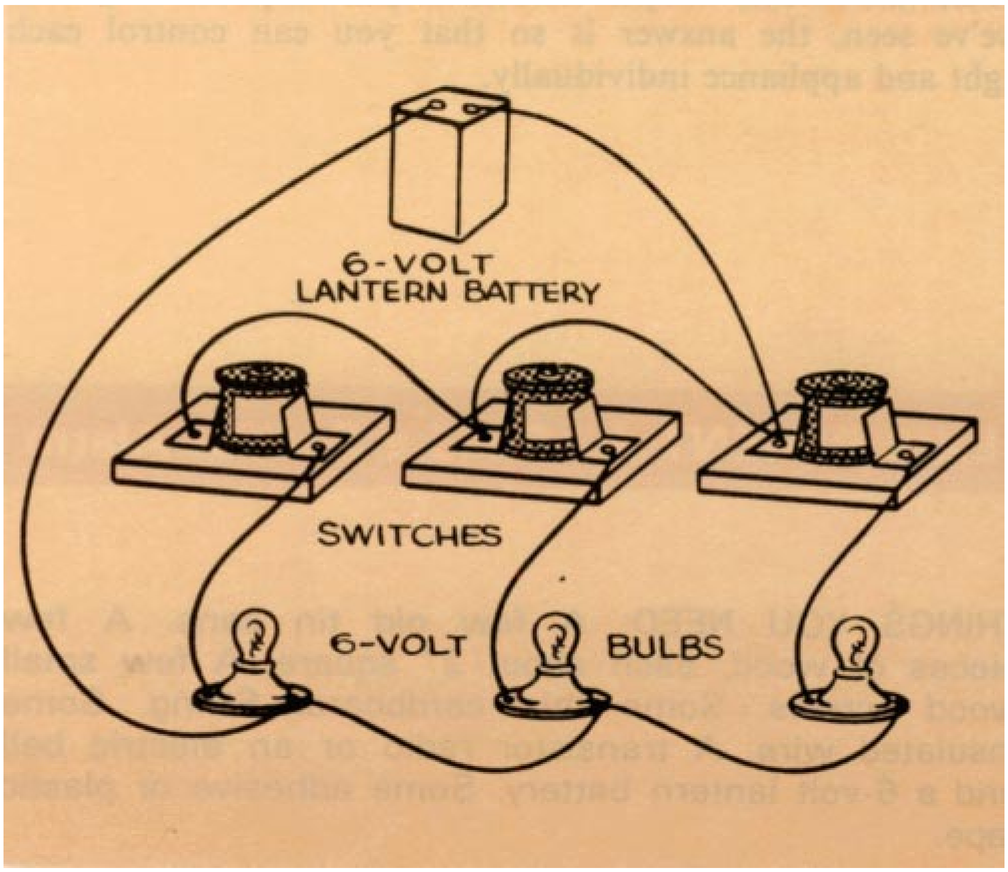
To discover another reason, unscrew one of the lit bulbs. All the other bulbs go out since the series circuit is broken. Imagine what would happen in a series-wired house if one light bulb burnt out — all the other bulbs would go out too.

EXPERIMENT 3: A Parallel Circuit

THINGS YOU NEED: Three homemade switches (from Experiment 1). Three 6-volt lantern flashlight bulbs. Three small sockets. 6-volt lantern battery. Some insulated wire.

A parallel circuit is one in which the current has more than one path to follow. Because of this, the current in each path can be controlled individually.

To demonstrate a simple parallel circuit, you'll need three switches: one to control each of three current paths. The diagram shows you how to interconnect the switches, the battery, and the three light bulb sockets.



It is important that you do not use the 1½-volt flashlight bulbs from the last experiment. There, the four bulbs were wired in series and their 1½-volt ratings added together to match the 6-volt output of the battery. In this experiment, though, each bulb is exposed to the full 6-volts; the 1½-volt bulbs would quickly burn out. So be sure to use the 6-volt bulbs called for in the "Things Needed" list.

Now try out the parallel circuit. Observe that each switch controls one of the three light bulbs individually — you can turn each bulb on or off without affecting the other two.

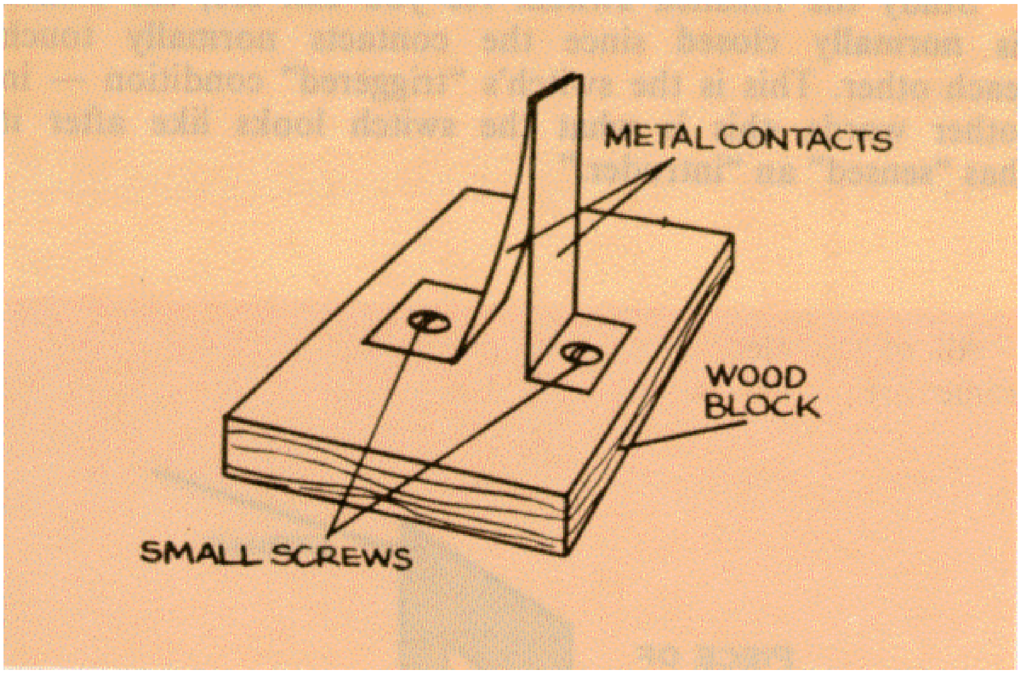
Similarly, if you unscrew one of the bulbs from its socket (pretending it is a burned out bulb) the other two bulbs remain lit.

All of the electric lights and appliance outlets in your home are wired in parallel. Can you explain why? As we've seen, the answer is so that you can control each light and appliance individually.

EXPERIMENT 4: Build a Burglar Alarm

THINGS YOU NEED: A few old tin cans. A few pieces of wood, each about 2" square. A few small wood screws. Some thin cardboard. String. Some insulated wire. A transistor radio or an electric bell and a 6-volt lantern battery. Some adhesive or plastic tape.

Let's build a burglar alarm using a parallel circuit. This simple burglar alarm really works. You can use it to watch over the windows and door in your room, and detect "intruders." What's more, it admirably demonstrates the parallel circuit principle that is used in home electrical wiring. Almost a century ago, Thomas Alva Edison, for whom Lewis Latimer worked, innovated and perfected the use of parallel circuits in home lighting, and invented various devices involved.

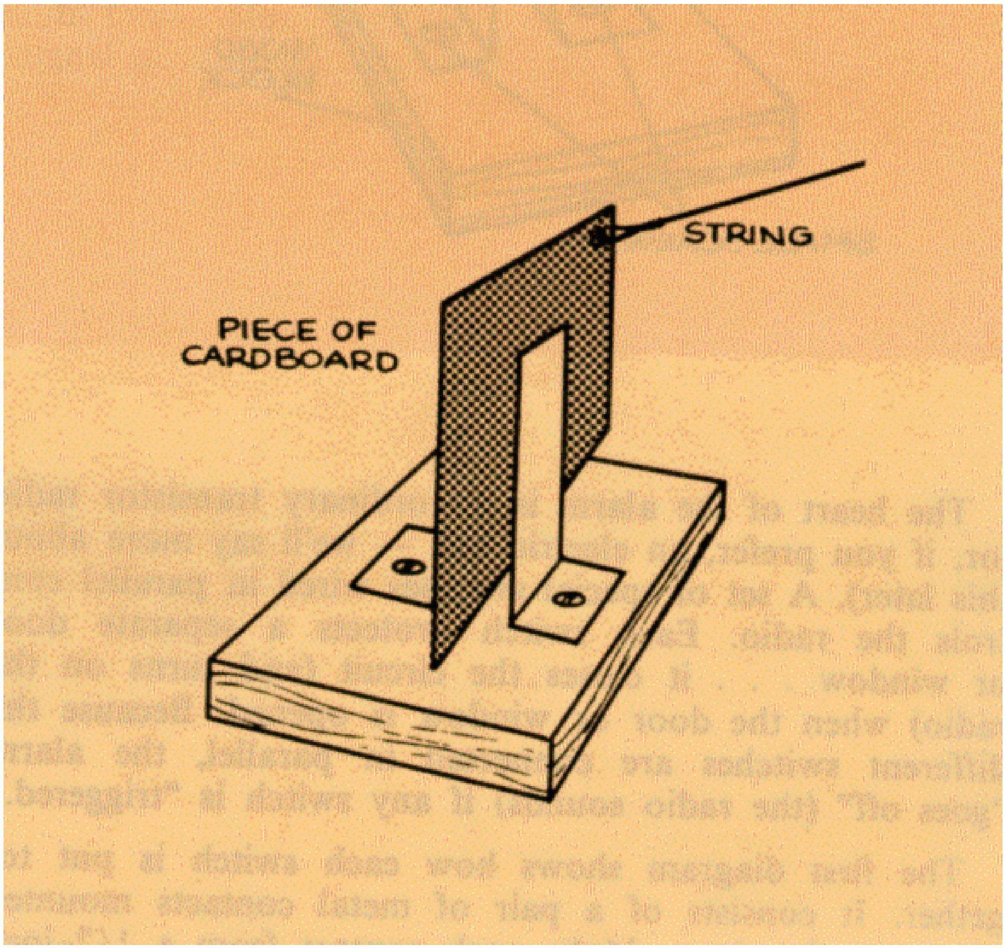


The heart of the alarm is an ordinary transistor radio (or, if you prefer, an electric bell — we'll say more about this later). A set of special switches wired in parallel controls the radio. Each switch protects a separate door or window . . . it closes the circuit (and turns on the radio) when the door or window is opened. Because the different switches are connected in parallel, the alarm "goes off" (the radio sounds) if any switch is "triggered."

The first diagram shows how each switch is put together. It consists of a pair of metal contacts mounted on a wooden base. Make each contact from a 1/2-inch by 2-inch strip of metal cut from a tin can. Follow the instructions for cutting up a tin can given in the first experiment; be careful of the sharp edges. Bend each metal strip into a crooked "L". The long leg of each "L" should be about 1½ inches long.

Make the base out of a piece of wood about 2 inches square. Fasten the short legs of the pair of contacts to the base with small wood screws. This is important: Position the "Ls" so that the tops of the long legs press against each other.

Study the finished switch. As you can see, the switch is **normally closed** since the contacts normally touch each other. This is the switch's "triggered" condition — in other words, this is what the switch looks like after it has "sensed" an "intruder."

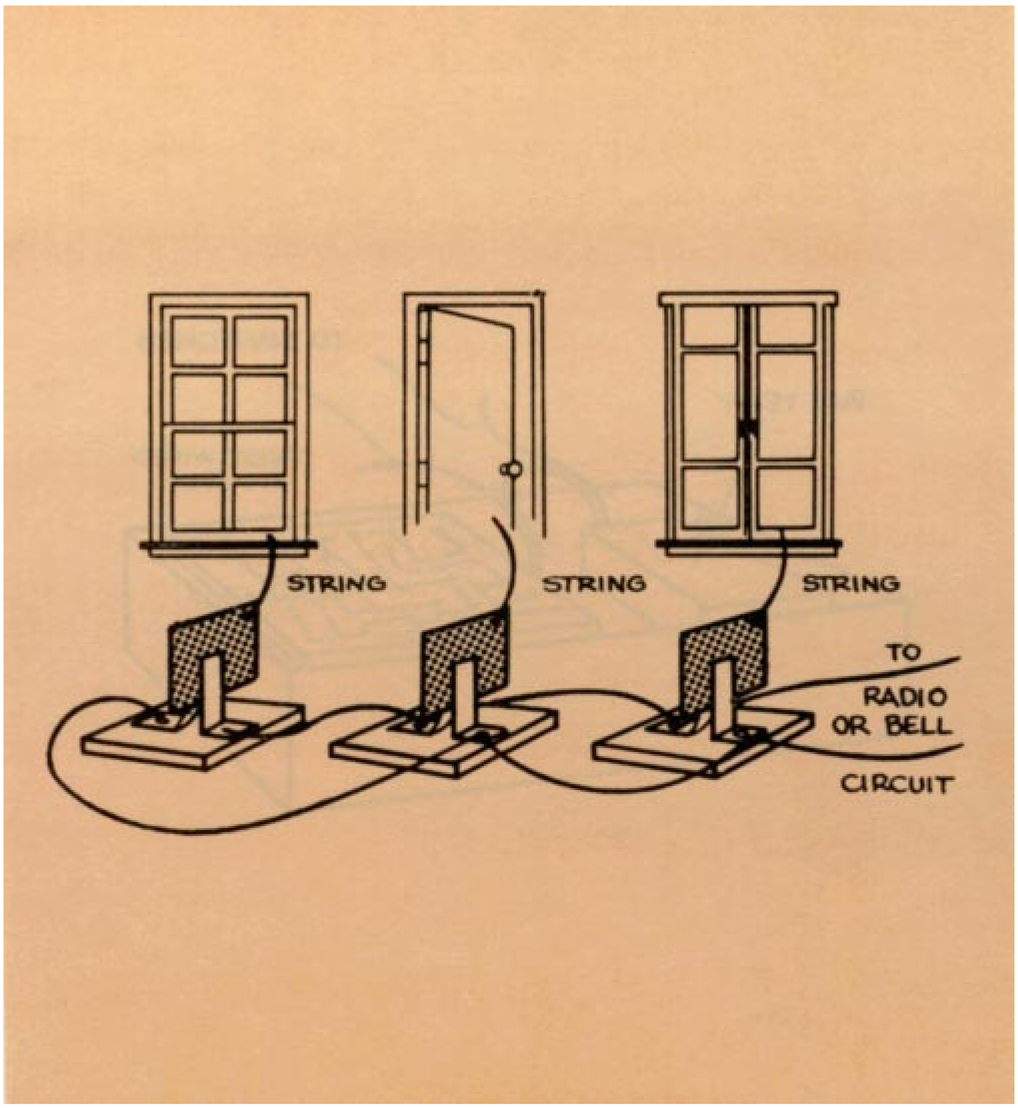


To set the switch — and make it ready to respond to an "intruder" — slip a small square of thin cardboard between the two contacts. The cardboard will hold the contacts apart and break the circuit. The second diagram shows you how to place the cardboard square.

Now, punch a small hole in one corner of the square and tie a length of light string through the hole. This completes the switch.

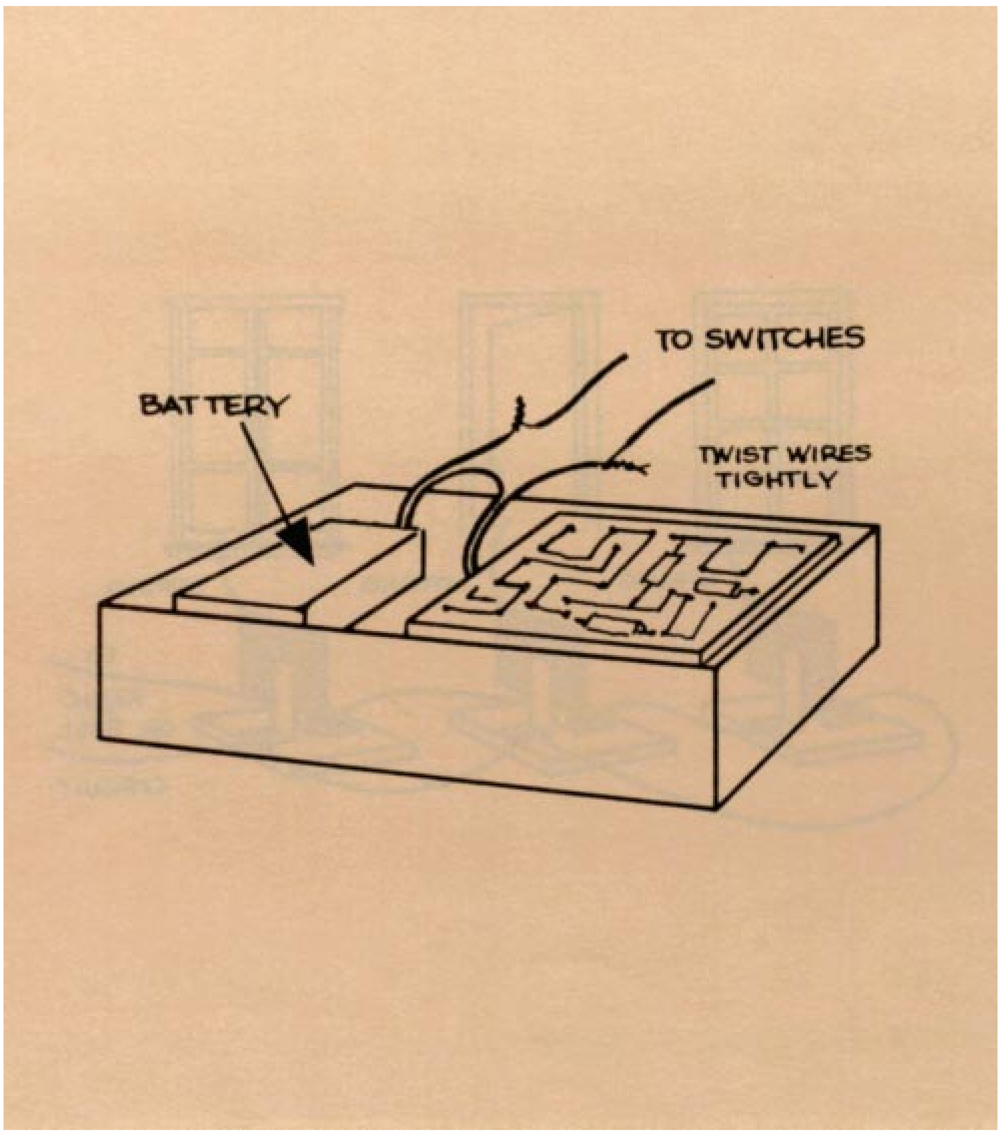
To use the switch, place it next to the door or window it will guard, then tape the free end of the string to the door or window. You may have to tape the switch down to hold it in place, and you probably will have to experiment to find the best string length. The idea is this: When the door or window is opened, the string should yank the cardboard square loose and close the switch.

Build a separate switch for each window and door in your room. Connect them in parallel with long lengths of insulated wire as shown in the third diagram.



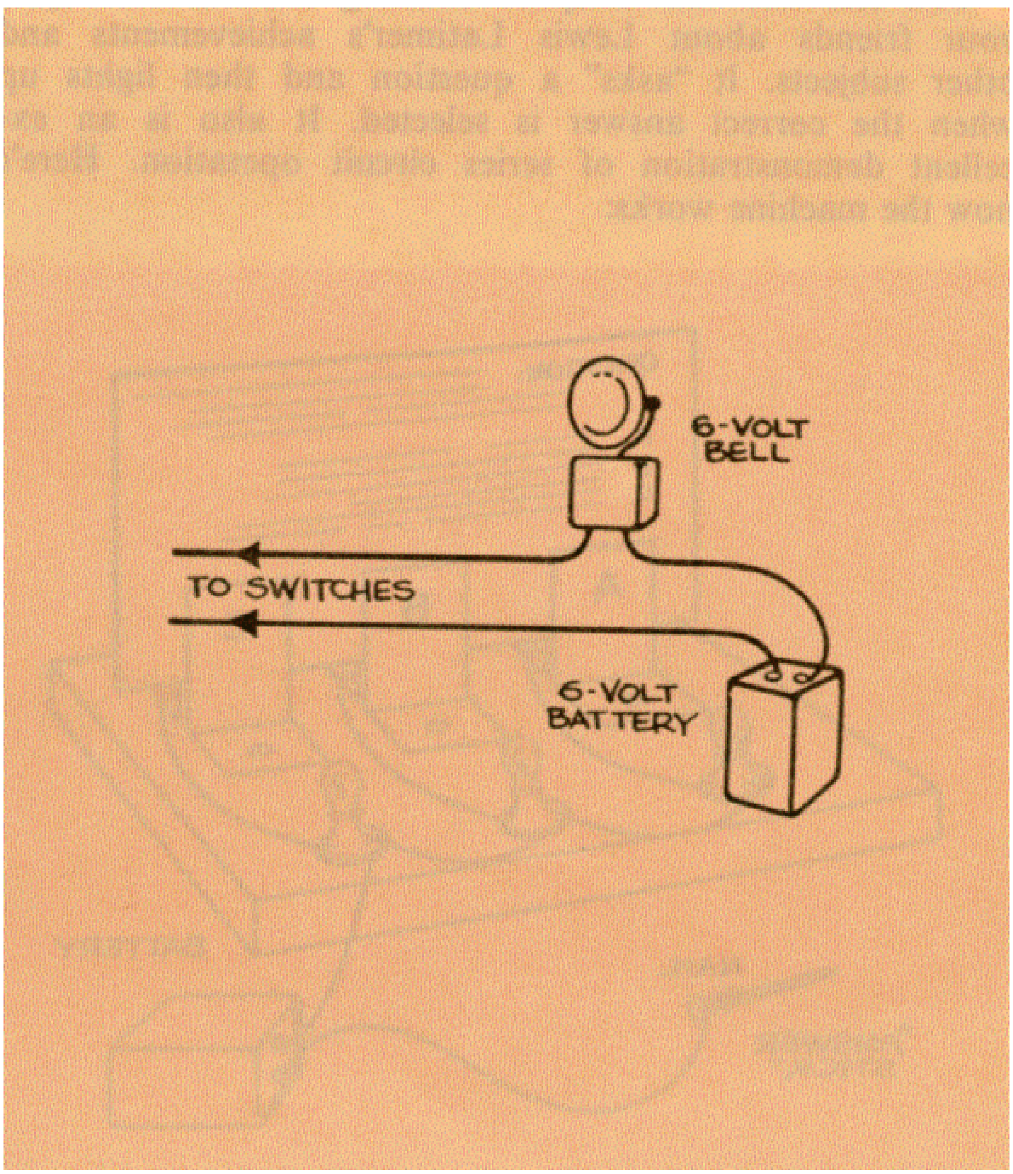
Finally, connect the transistor radio to the switch circuit. Because the switches are wired in parallel, you can connect the radio across any of the switches. Here's how:

Open the radio and find one of the two wires that run to the battery. Carefully cut the wire near its midpoint, then remove about 1/2 inch of insulation from the end of each half. Now use insulated wire to join the two wires from the radio to one of the switches (see the fourth diagram).



To activate the alarm, simply turn the radio's power switch to "on." If any of the window or door switches are "triggered," the radio will instantly sound a warning. Reset the alarm by replacing the pulled-out piece of cardboard.

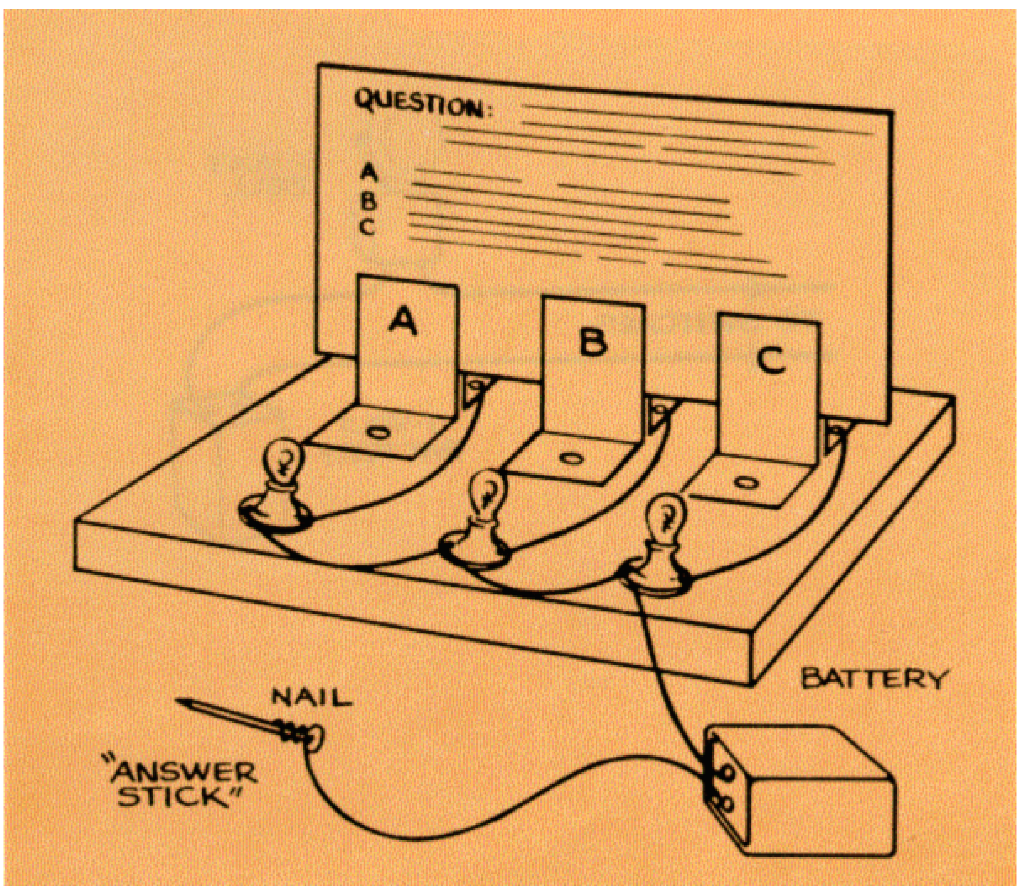
Instead of a radio, you can use an electric bell as the signal device. You'll need a "front door bell" (sold in hardware stores) and a 6-volt battery. The fifth diagram shows how to wire the bell and battery to the window and door switches.



EXPERIMENT 5: Build a ´´Teaching Machine``

THINGS YOU NEED: One or two old tin cans. A piece of wood about 6 inches by 8 inches. A few small wood screws. Three 6-volt lantern flashlight bulbs. Three small sockets. Some thin cardboard. Some insulated wire. A piece of aluminum foil. A long nail. A crayon or some paint and a narrow brush.

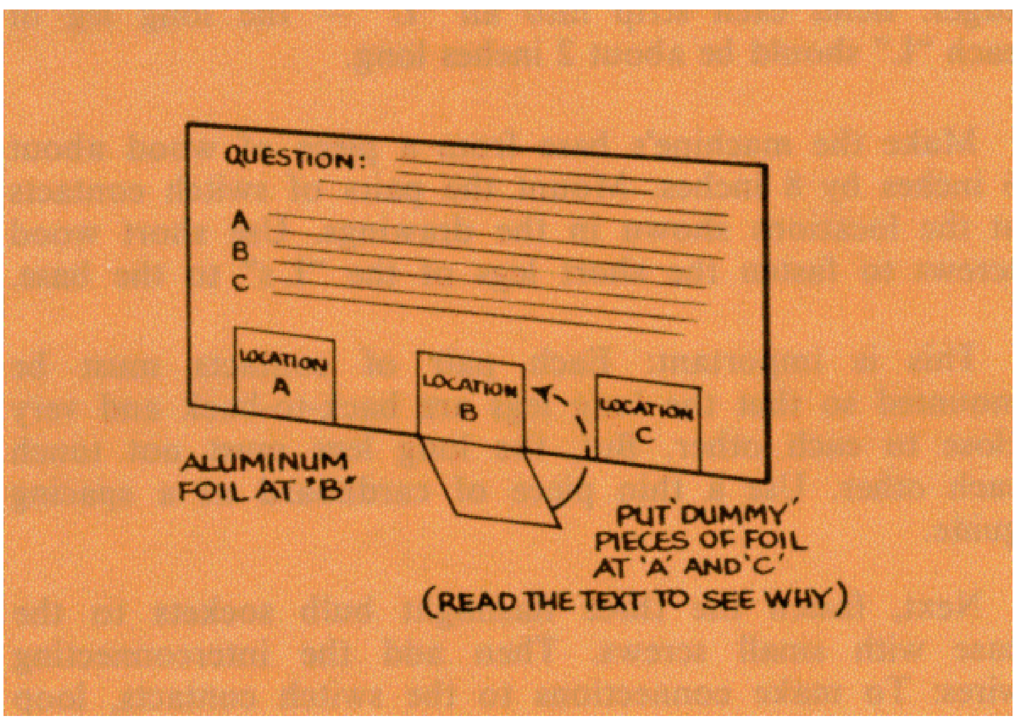
You can use this simple "teaching machine" to quiz your friends about Lewis Latimer's achievements and other subjects. It "asks" a question and then lights up when the correct answer is selected. It also is an excellent demonstration of series circuit operation. Here's how the machine works:



You insert a special "question card" into the machine. The card has a question written on it, plus three possible answers . . . these are labeled "A," "B," and "C." Your friend reads the question and then touches the "answer stick" to one of the three "answer bars." If he has chosen the correct answer, the corresponding "answer light" lights up. If not, the light remains out.

The secret of the machine's operation can be found at the bottom of the specially prepared question card. Notice the small piece of aluminum foil. Besides presenting a question, the card serves as a switch "element" that controls the answer lights. Here's how:

The question card slips into a trio of switch contact pairs . . . each of which is wired in series with one of the answer lights (look at the diagrams if you find any of this confusing). You must decide in advance which answer . . . "A," "B," or "C" . . . will be the correct answer. Then, you prepare the card by cementing a piece of aluminum foil to the card's bottom edge, at the corresponding location.



As an example, let's say that for a particular card you decide that "B" shall be the correct answer. After writing the questions and answers on the card (the correct answer "B" and two false answers "A" and "C"), you glue a piece of foil to the card at location "B" (see the second diagram).

When you insert the card into the switch contacts, the foil completes the series circuit that controls answer light "B." Thus, when your friend touches answer bar "B," the "B" bulb lights up. But, if he touches bar "A" or "C," nothing happens — their circuits are not completed by a piece of foil.

The same sort of thing happens if you make "A" or "C" the correct answer; the foil completes the appropriate circuit so that only answer light "A" or "C" will light. Here's how to build the machine:

You'll need three pairs of switch contacts. Make each contact from a strip of tin-can metal about 1 inch by 3 inch. Follow the instructions for cutting open an old tin can given in the first experiment; be careful of sharp edges. Bend each strip into an "L" — the long leg of each "L" should be about 2 inches long.

Make the machine's base from a piece of wood about 6 inches by 8 inches. Mount the pairs of switch contacts at the locations shown in the drawings. Use short wood screws to fasten the short legs of the "Ls" to the base.

This is important: Each pair of contacts must be mounted so that the long legs are back-to-back and very close to each other. But, the long legs must not touch each other. Use a thin piece of cardboard as a spacing guide.

Next, fasten the three flashlight bulb sockets to the base with small screws. Then add the interconnecting wires: To make connections to the switch contacts, loop the ends of the connecting wires underneath the mounting screws and then tighten the screws.

Use a long nail as the answer stick. Make its connecting wire from a 3-foot length of insulated wire. Strip about 3-inches of insulation from one end and wrap the bare wire tightly around the nail (near its head).

Connect the wire's other end to one of the battery terminals, then run a wire from the other battery terminal to the machine.

The answer bars are the front contact of each pair of switch contacts. Label them "A," "B," and "C" with paint or crayon. Similarly, label the three answer lights.

Make each question card from a 5 by 6-inch piece of thin cardboard. Think up a question first. Then, find out the correct answer and make up two wrong answers.

For example: **Lewis Latimer was a member of a unique group of electrical scientists. What was the group's name?**

A. THE CIVIL WAR ELECTRICIANS

B. THE TELEPHONE WORKERS OF AMERICA

C. THE EDISON PIONEERS

Do you know which answer is correct? "C," of course!

Carefully print the question and answers on the question card. Next, cement a piece of aluminum foil about 1 inch by 2 inch to the cardboard at the appropriate location. For the question above, the foil goes at location "C."

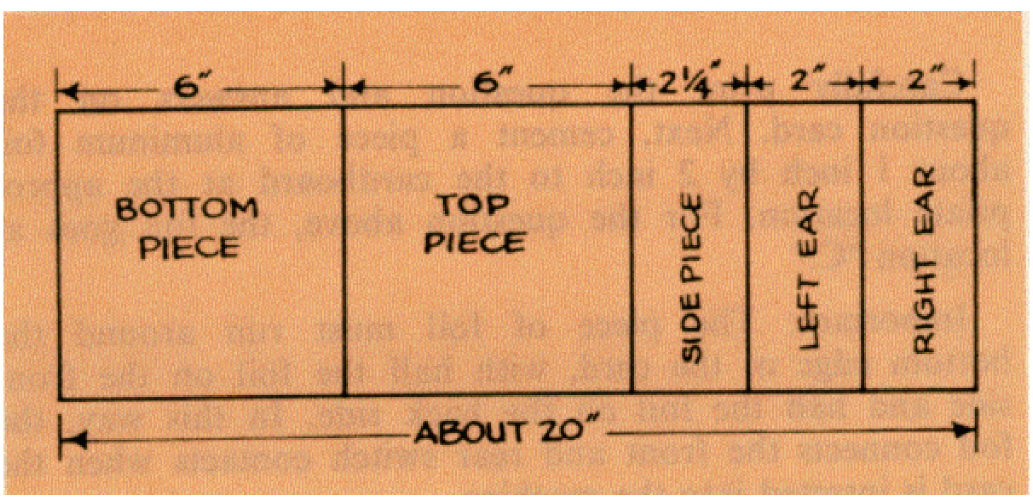
Important: The piece of foil must run around the bottom edge of the card, with half the foil on the front side and half the foil on the back side. In this way, the foil connects the front and rear switch contacts when the card is inserted into the machine.

When you make up different question cards, be sure to vary the location of the correct answer from card to card. Some correct answers should be at "A," some at "B," and others at "C."

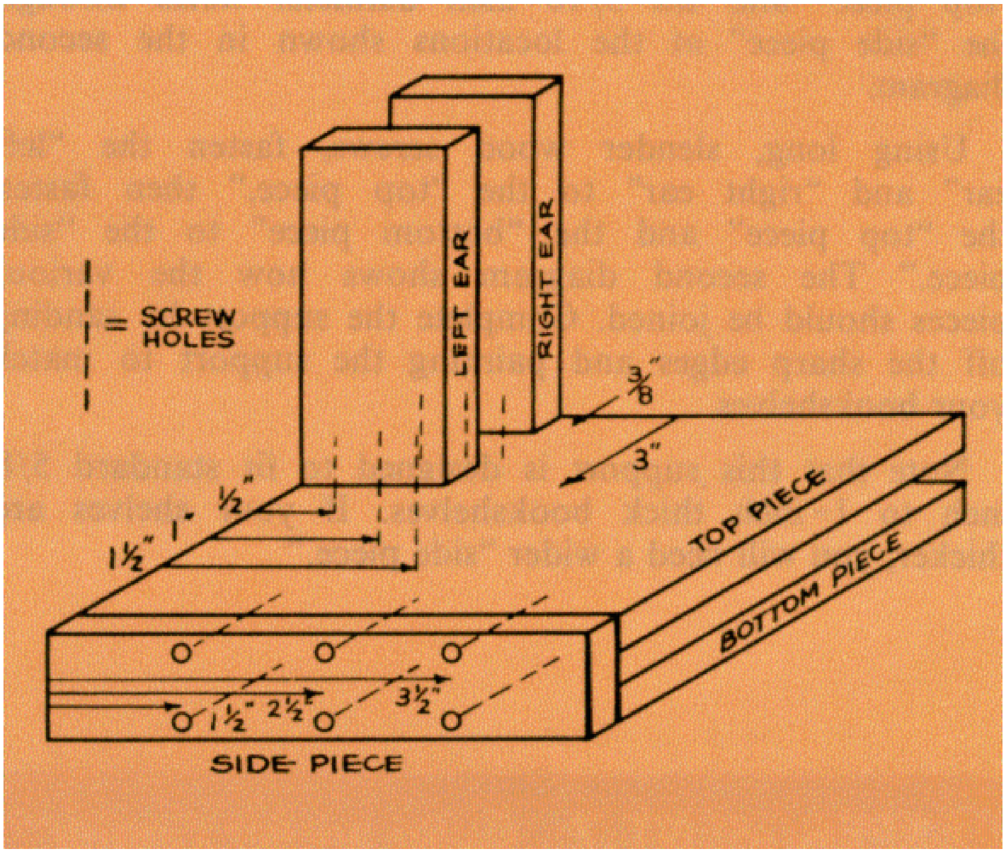
One final point: If your friend sees the question card before you put it into the machine, he may notice the location of the piece of foil, and learn the correct answer before he reads the question. To prevent this, you can put "dummy" pieces of foil on the front of the card at the two unused locations. Make sure that these dummy pieces do not loop around the bottom of the card, so that they can not touch the rear switch contacts.

EXPERIMENT 6: Build a Simple Book Support

THINGS YOU NEED: A 20-inch length of "one-by-six" pine board (the kind lumber yards sell as shelving). A few long wood screws. Sandpaper. Paint or stain or varnish.



In 1905, Lewis Latimer patented an ingenious book support for a shelf or bookcase. Nope . . . it doesn't work electrically: It is a simple mechanical design that demonstrates Latimer's inventive grasp of basic mechanical principles. A nice feature is the two-way mounting:



The device will brace up the top or bottom edge of a row of books (see the drawings of Latimer's original support).

Latimer fashioned his support out of sheet metal, but you can build a similar unit out of inexpensive pine board.

You assemble the support by screwing together five pieces of wood. We've given each piece a name to make it easier to talk about putting the pieces together.

Begin by cutting the five pieces from an 18 inch length of “one-by-six” pine board. (The board you buy at the lumber yard will actually measure 3/4 inch thick and about 5½ inches wide — 1 inch by 6 inches are nominal, or approximate, dimensions.) The first diagram shows you how to cut the board into the different pieces.

Next, drill six 3/16-inch diameter holes through the “top piece” and six 3/16-inch diameter holes through the “side piece” at the locations shown in the second diagram.

Using long, slender wood screws, fasten the “left ear” and “right ear” to the “top piece,” then fasten the “top piece” and the “bottom piece” to the “side piece.” The second diagram shows how the various pieces should be joined. Complete the support by sanding off the sharp edges and painting the support to match your bookshelves.

Note that this support is designed to fit standard 5/8 inch to 1-inch thick bookshelves. If your shelves are thicker, you will need a wider “side piece.”

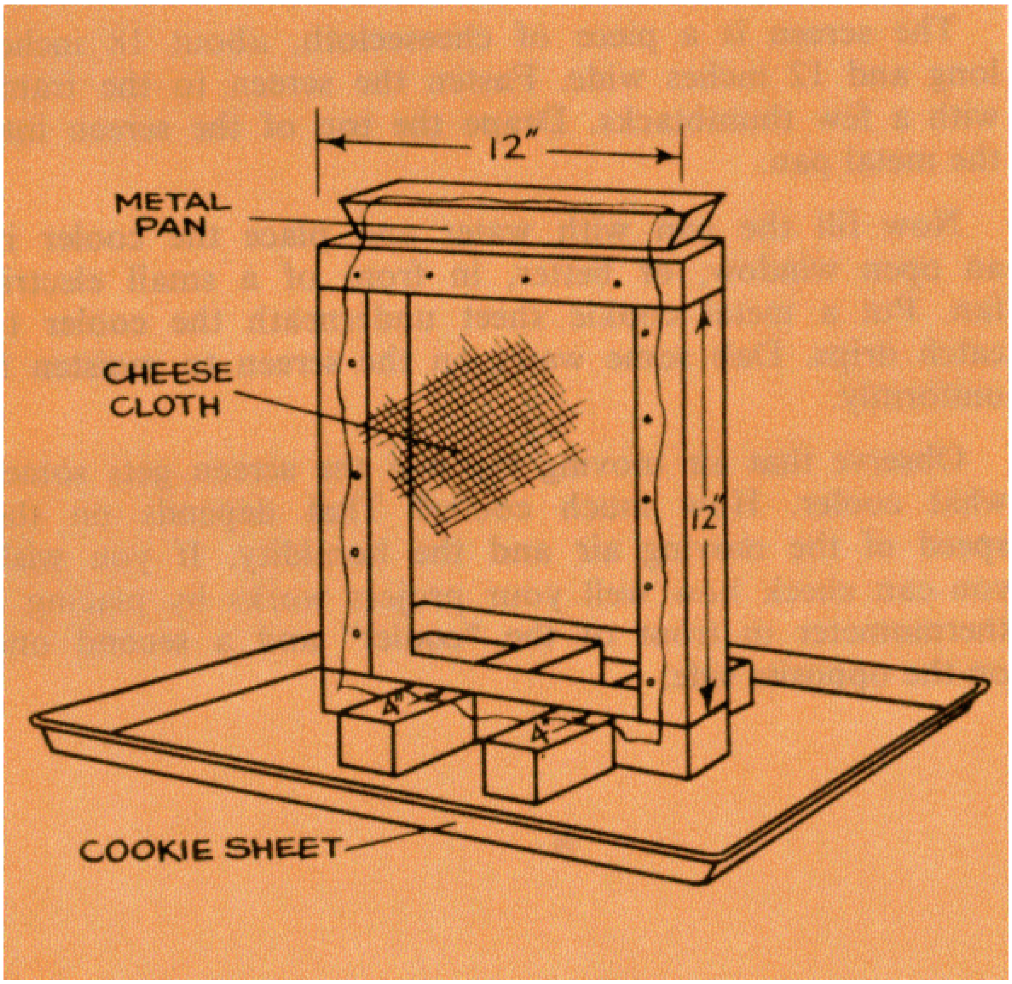
EXPERIMENT 7: Build an Air Cooler

THINGS YOU NEED: A 6-foot length of “two-by-two” wood stock (the kind lumber yards sell as wall studding). A few wood screws or wood glue. A narrow metal loaf cake pan. Some cheesecloth. A few thumbtacks.

One of Lewis Latimer’s simpler inventions is an “apparatus for cooling and disinfecting” room air. It works on a familiar scientific principle: When water evaporates, it absorbs heat.

Latimer's original patent drawing shows a wooden frame that supports a cloth screen. A small tank atop the frame is filled with water. The upper edge of the screen rests in the tank, and water "wicks" down to dampen the whole screen.

As air moves through the screen, the water evaporates



. . . and the air loses heat. To disinfect the cooled air, Latimer suggested adding some disinfectant solution to the water tank.

You can quickly build a similar cooler to place on your window sill. Will it work? Yes indeed . . . providing you try it on a low-humidity day. On a hot, humid day the cooler won't work efficiently because the water will not evaporate readily.

Make the frame out of "two-by-two" wood stock (the wood you buy will actually measure about 1¾ inch square). A 6-foot length will be enough. The drawing shows the lengths of the main frame pieces and of the four corner legs. Screw or glue the frame together, then cement the metal cake pan on top of the frame. Be sure to use waterproof glue such as epoxy.

The screen is a piece of cheesecloth, about 18 inches long and 12 inches wide. Fasten the screen to the frame with a few thumbtacks. Drape the top of the screen into the metal pan.

Now fill the pan with water and place the cooler in an open window, or better, in front of a small electric fan. Put a metal cookie sheet underneath the cooler to catch drips. Dab some water on the screen to moisten it uniformly.

Observe that air moving through the screen gets somewhat cooler. How much cooler? That depends on the speed of the moving air and the humidity. If you wish you can check how well your project works by placing a thermometer in front of the "cooler" and a second one on the opposite side.

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